

# EcoNomics™ assessment of essential services provision for remote communities

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Gavin Shearing BComm (Acct) Grad Dip CA has 17 years' experience in utility industries including electricity and telecommunications. His roles include contract management, product development, risk management, forecasting, business analysis and financial analysis at management and executive levels.

Gavin's current role involves ensuring the viability of Horizon Power's remote service extension program. This includes financial analysis and modelling of new and existing power systems, business case preparation, risk analysis, stakeholder management and securing project funding.

Gavin's key strength is in quantifying and balancing competing priorities. By identifying key requirements and determining costs and social, financial and environmental benefits, the best value solution can be developed.

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## Introduction

There are 287 indigenous communities in Western Australia that accommodate approximately 17,000 people. It is well-documented in national and international literature that the residents of these communities generally suffer from lower health, wellbeing and access to economic opportunities than mainstream Australian people. Delivery of essential services (ES)—appropriate levels of power, water and wastewater—will help to alleviate this situation.

Essential services to remote communities has been and is currently provided under many different delivery models (DMs), including variation in the delivery structure (DS) such as through outsourced contractors, utility-based solutions, combinations, and self-management by the community. The delivery models also have variation in the level of service (LOS) provided to the communities they cover, with different standards and outcomes for water quality, wastewater standards and power reliability. Thus each delivery model is a combination of a delivery structure and a level of service. Currently, the delivery of ES to remote indigenous communities remains a challenge, with 2006 figures showing 51% of 322 discrete communities Australia-wide experiencing water supply interruptions in the last 12 months; the figures for sewerage overflows was 40%, and electricity interruptions 76%.

Across the history of ES provisions to remote communities there has been debate, review and restructure over what is the most appropriate, sustainable and effective delivery models and strategies with which to enact them. The business case for various delivery models of ES to remote communities is generally examined from a financial perspective with some consideration made to other non-financial effects from a subjective point of view. The relative costs and benefits of delivering ES under the various DMs are yet to be examined from either a financial or a full economic point of view.

Horizon Power is a State Government-owned power company that provides power supplies to Western Australia's regional areas. They recognise that providing affordable energy solutions is critical for the support of economic development opportunities in remote areas. They have been involved with the implementation of energy supplies in some of these communities. They have an interest in expanding their services to the other communities, as well as complementing their power provision with water and wastewater provision services in these communities. In doing so, they are keen to examine the financial prospect, as well as the full economic prospect of this essential services provision.

## Assessment objective

On this basis, Horizon Power approached WorleyParsons to conduct an EcoNomics™ Assessment to examine the case for provision of ES to remote communities from a full social, environmental and financial perspective. Horizon Power gathered a range of ES provision stakeholders to set up and provide input into the project planning, framing and analysis. In August 2009, the stakeholders participated in a 1 day workshop that focused

on open discussion and a search for consensus. The result was the definition of a key objective and the identification of delivery models to be assessed.

“Identify the most environmentally, socially and economically sustainable essential services delivery model(s) for remote communities (including indigenous communities) in Western Australia, given their unique characteristics.”

This study aimed to provide insight on the overall economics and sustainability of each identified valid delivery model for ES provision. This took into consideration the likely real changes in the values placed on key internal and external issues, notably power prices, benefits of electrification, GHGs, sanitation benefits, fire damage and water. Given the variation in the value of many of these, the economic sensitivity of each option to real relative changes in values was also examined.

## Results

Provision of essential services to remote communities in Western Australia is a costly exercise from a financial perspective. However, significant societal benefits are accrued, which are rarely considered and traditionally not quantified during the decision making process. Including a quantitative perspective on these wider social benefits provides a complete economic picture of investment alternatives, and reveals a significantly different result from the traditional financial analysis.

From a financial perspective, the current business as usual option (outsourced with RAESP standard delivery) is better than all other options except two—the self-managed option and the utility + engagement (new standard) option. The self-managed option has significantly less capital and operating costs than BAU, while the utility + engagement (new standard) option is more expensive, but has fuel savings and additional revenues which outweigh the additional capital and operating costs required to achieve it. All other options are more expensive than business as usual across the aggregated portfolio of communities and for the majority of individual community types.

When including explicitly monetised values for the external environmental and social issues associated with each option, all options considered, except one—utility/outsourced (mainstream standard)—are more economic than business as usual. This holds for each community type examined, and across the aggregated portfolio of communities. This demonstrates that the quantification of these issues is important to support rational decision making.

The results also clearly show the importance of a longer term perspective in the planning process. Since most of the wider social benefits accrue over time, year-by-year, a short-term planning horizon does not reveal their full value to the communities in question. Only by examining essential service provision over several decades, as has been done in this assessment, can the real value of its provision be seen.

For large communities and remote communities with capacity, represented by Warburton, Wingellina and Djugerari and accounting for 62% of the total population, the utility + engagement (new standard) option is the best option under base case and the majority of possible combinations of conditions assessed. It is the most economic option when applied across the aggregated portfolio of communities. Under base case conditions, it represents a 40 year net present value (NPV) improvement of \$1.5 billion to Western Australia over the value provided by the business as usual option. It is economic (NPV positive) compared to business as usual in over 95% of possible conditions assessed. The economic case for moving to this newer model is compelling. Moreover, it can be seen, based on the sensitivity analysis, that the longer term socioeconomic upside of moving to this new delivery model is significant, and can be readily measured in the billions of dollars over the next several decades.

The utility + engagement (new standard) option is the most economic option for small remote communities with capacity, due to the relatively high financial costs of delivering the BAU option for remote communities, such that the additional financial costs of moving beyond BAU are relatively smaller than observed for other communities. The non-financial benefits, despite the small populations, are thus more dominant relative to these additional financial costs, than for other small community types.

Reduced fuel use savings, additional revenue, fire risk reduction, and life expectancy improvement are the most significant contributors to the positive economics of the utility + engagement (new standard) option,

significantly greater than the additional CAPEX and OPEX incurred to achieve it. Associated benefits from an increased number of community role models and an increase in local employment are also significant contributors.

The utility (new standard) option is also economic under a wide range of possible future conditions, and is the second most economic option across the entire aggregated portfolio under base case conditions. Costs are similar to those for the utility + engagement (new standard) option, though the extent of external benefits from community role models and an increase in local employment are less.

The self-managed (emergency advisory) option is the most economic for smaller community types, represented by Mount Margaret, Bow River and Windidda, accounting for 38% of the total population. It is an economic option across the aggregated portfolio under base case conditions and a wide range of possible conditions. Significant savings in CAPEX and OPEX drive this result. However, this option is unlikely to be considered as a viable option given that it represents a step backwards in terms of providing essential services and the external benefits that are associated with them. In these situations, the communities are simply too small, and the costs of providing any of the other options examined too high, to make financial or wider economic sense. The clear challenge here is to determine whether cheaper alternative models can be developed that better match the overall level of expected benefits that these communities will derive, or to examine policy alternative that would allow aggregation of these communities with nearby neighbours, allowing a higher level of service to be justified.

The more expensive mainstream delivery standard options are consistently less economic than the new standard options, primarily due to their higher capital and operating costs.

Both new standard and mainstream options become increasingly economic with a greater degree of utility and community involvement (i.e. moving from utility/outsourced to utility only to utility + engagement). This is primarily due to increased societal benefits that accrue from these latter two delivery models and increased efficiencies in the operational expenditures.

Most of the external assets considered had an impact on the assessment, with fire risk reduction, life expectancy improvement, role model benefits, productivity improvement, local employment benefits and greenhouse gas emissions the most significant of these.

**Table 1 Full portfolio results**

Exemplar community	Community type (with capacity)	Community pop.	Type pop.	Type pop. as % of total pop.	Optimum economic option	NPV (compared to BAU)
Warburton	Hub (Y)	700	6,880	43%	UE-NS	\$419m
Wingellina	Self-Servicing (Y)	160	2,168	13%	UE-NS	\$347m
Mount Margaret	Spoke (Y)	100	3,048	19%	SM-EA	\$346m
Bow River	Spoke (N)	80	2,555	16%	SM-EA	\$423m
Djugerari	Remote (Y)	60	957	6%	UE-NS	\$224m
Windidda	Remote (N)	50	550	3%	SM-EA	\$134m
TOTAL	-	-	16,158	100%	-	\$1.89b

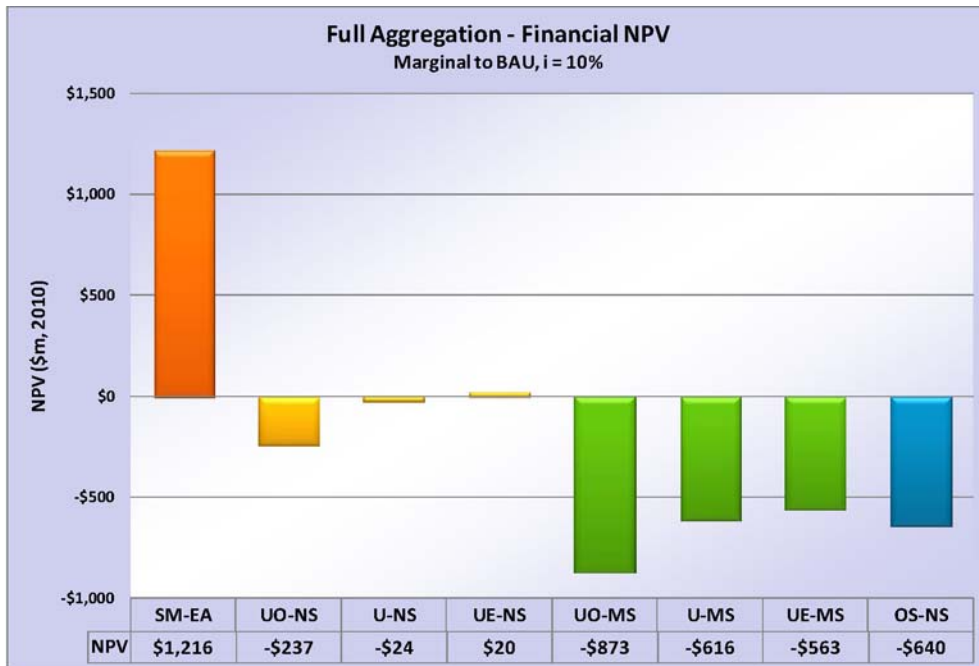


Figure 1 Base case results—full portfolio—financial NPV (marginal to BAU),  $i = 10\%$

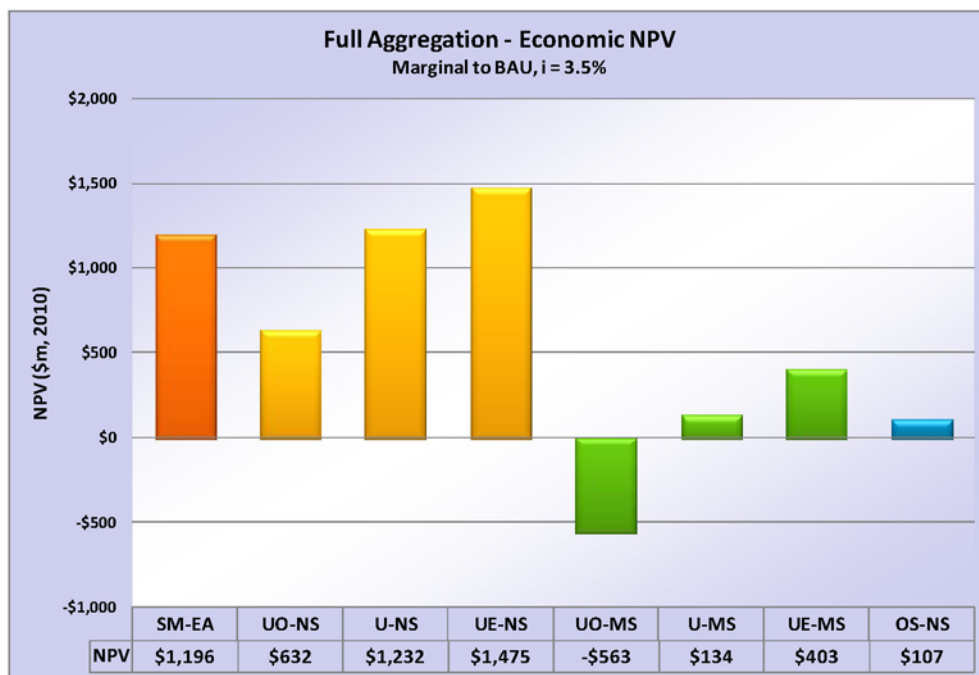
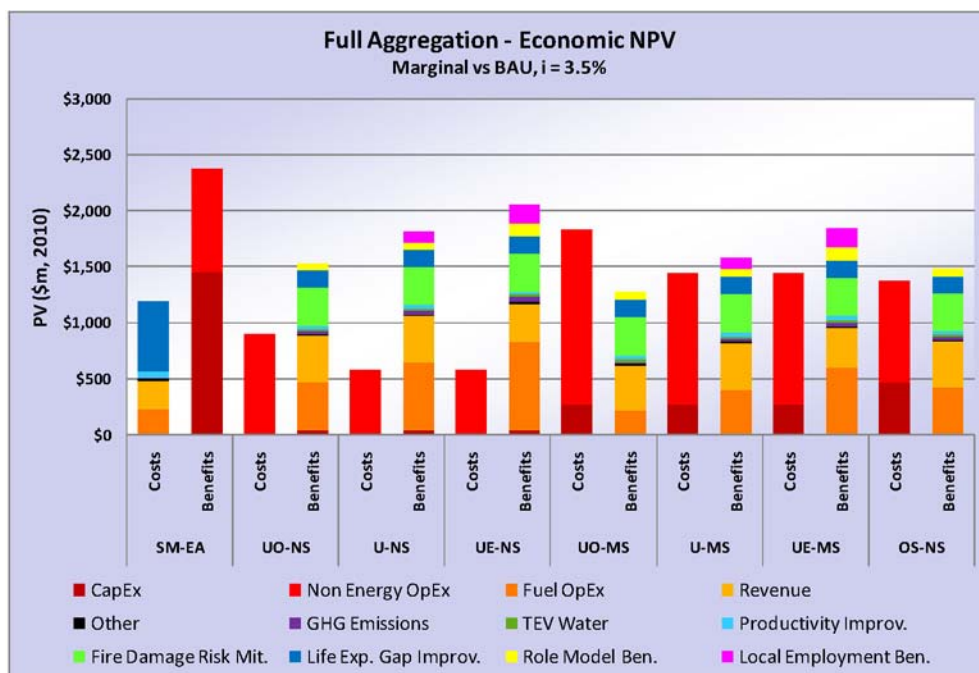


Figure 2 Base case results—full portfolio—economic NPV (marginal to BAU),  $i = 3.5\%$



**Figure 3 Base case results—full portfolio economic PV breakdown (marginal to BAU), i = 3.5%**

### Implications

The assessment has confirmed that the financial costs of essential service provision are significant. All options, including the current business as usual option (outsourced at RAESP standard), are expensive propositions in terms of both capital and operating expenditure. What this assessment has shown is that significant cost savings are achievable from better design and operation principles, as represented by the new standard and mainstream standard options. Fuel operating cost savings are particularly significant. Further optimisation of the design and operation of these systems are likely to generate further savings.

Inclusion of non-financial considerations, coupled with a longer-term examination of the issues, has a significant impact on the determination of the optimal option. While from a financial perspective, most options are worse than BAU across the entire portfolio under base case conditions, all except one option were more economic propositions than BAU upon inclusion of non-financial considerations. The utility + engagement (new standard) option, if applied across the entire portfolio, achieves almost \$900m in additional non-financial value above BAU under base case conditions. This demonstrates that quantification of the relevant social and environmental issues is important to support decision making.

For large communities and remote communities with capacity, the utility + engagement (new standard) option is the most economic, while for smaller communities, the self-managed option is the most economic. Many of the non-financial benefits are directly related to population size, such that for larger communities, the relative non-financial benefits delivered by the utility + engagement (new standard) option exceed the financial costs of delivery. The significance of population size on the choice of delivery model is an important finding.

For community types where the self-managed option is the most economic, it represents an increase in total economic value of approximately \$900m compared to BAU under base case conditions. This is comprised of a reduction in financial cost of \$1.15 billion, but also a consequent reduction in non-financial value of approximately \$250 million. For these communities, the utility + engagement (new standard) option is the 2nd best option, representing an increase in total economic value of approximately \$500m comprised of a reduction in financial cost of \$200 million and a consequent increase in non-financial value of approximately \$300 million.

Providing a self-managed solution represents a step backwards in terms of providing essential services, and the external benefits that are associated with them. However, moving to the next best option represents a reduction in total economic value of \$400m, comprised of an increase in financial costs of \$950M but also an

increase in non-financial value of \$550m. Thus it is clear that for these smaller community types, the financial costs are not commensurate with the benefits that are delivered. The challenge is to provide the \$550m in additional non-financial value delivered by the utility + engagement (new standard) option above the self-managed option, without incurring the \$950m in additional financial costs. Or, alternatively, additional research could be done to examine other service level—delivery models whose cost better matched the potential overall social benefits generated. From a policy perspective, other measures could also be considered, including gradually moving to aggregate smaller communities to reach the critical mass required for a truly beneficial service provision, or to explicitly accept that essential services to these smaller communities is not economic, but that on aggregate, if we adopt the UE-NS model across the portfolio, the overall statewide outcome will still result in a significant overall improvement (In the order of \$1.5 billion NPV).

Innovative, cost-effective, community-based solutions for delivering non-financial value need to be identified and considered. The scope of thinking will most likely need to extend beyond the bounds of essential service provision alone. As much as it represents a challenge, it is also a significant opportunity for Horizon Power to enhance the value of their existing services to these communities. Engagement with the wider community, by such initiatives as nation-wide competitions seeking innovative technical solutions, or engaging external organisations (e.g. not-for-profit, non-government organisations) with expertise in delivering long term social and environmental welfare to communities, would come with significant reputation and market value for Horizon Power.

Of the delivery models considered in this assessment, the utility + engagement (new standard) has been shown to be the most economic option for 62% of the total population assessed, in over 93% of possible conditions assessed. These communities represent larger communities and remote communities with capacity. It is the most economic option if applied across the entire portfolio of communities, achieving a 40 year net present value of \$1.5 billion above the current business as usual delivery model under base case conditions. It is an economic (NPV positive) option in over 90% of possible conditions assessed (compared to BAU). Even from a purely financial perspective, it is an NPV positive option (compared to BAU) under base case conditions (additional NPV of \$20m).

For smaller communities, utility + engagement (new standard) is the second best option, with the self-managed option the best option. However, this option is unlikely to be considered as a viable option given that it represents a step backwards in terms of providing essential services and the external benefits that are associated with them. In fact, if this option is removed from the assessment, then for all communities, under 100% of all possible combinations of conditions, utility + engagement (new standard) is the most economic option. This is an extremely important finding.

