Maximizing Energy Revenues – Providing the Best Incentive to the Contract Operator

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ABSTRACT

Communities that own waste-to-energy (WTE) facilities rely heavily on the revenues generated by their facility to help pay for the costs to finance, operate and maintain these facilities. The two primary revenue streams are tipping fees and energy sales, generally in the form of electricity. While communities often retain all of the tipping fee revenue, revenue from the sale of energy is nearly always shared with the contract operator. In some cases the shared energy revenues include both capacity and electricity payments. The basis of this strategy is to offer the contract operator an added incentive to maximize this revenue stream through more efficient operation and, in the case of capacity payments, to meet certain capacity commitment criteria required by the energy purchaser. This strategy recognizes that the contract operator has some degree of control over the factors that affect energy production.

Under most existing service agreements, which date back to the 1980s, energy revenues are shared on a 90/10 basis, with 90 percent going to the community. Now that many of these service agreements are coming up for renewal or are expiring, communities will need to revisit how best to share energy revenues with the contract operator in order to maximize the total revenues retained by the community. This paper analyzes several different approaches to sharing energy revenues in light of the operational experience gained over the past 20 plus years and concludes that, while energy revenue sharing is still in the best interest of the community, the widely employed strategy of a 90/10 split may not offer the best incentive, and therefore may not lead to the maximization of energy revenues to the community.

INTRODUCTION

As of 2004, there were 89 WTE facilities operating in the United States [1]. Most of these projects were developed in the 1980s and early 1990s and are approaching 20 years of operation. More than one-third of the WTE facilities are publicly owned, with the vast majority of these plants being operated and maintained by private firms under 20 or 25 five year service agreements. The contract operator’s compensation typically consists of either an annual service fee or a processing fee for each ton of waste processed and, in many cases, a share of revenues from the sale of energy and metals recovered from the waste and/or ash streams.

Most of the original service agreements for publicly owned facilities will be coming up for
renewal or will be expiring within the next 5 years, which will require these communities to negotiate new service agreements either with the current operator on a sole-source basis or as part of a request for proposal process. This presents an opportunity for the community to review the terms and conditions of the original service agreement in light of the operational experience gained over the first term including the merits of sharing a portion of the energy revenues with the contract operator. Energy revenues have historically been a significant source of additional revenue to the contract operator, representing as much as 10-15 percent of their total revenues.

PAST ENERGY REVENUE SHARING PRACTICES

Energy sales are also a significant source of revenue to the community and are critical to achieving a competitive tipping fee. Total energy revenues can be equivalent to $20-$40 per ton of waste depending on the energy contract price. Therefore, maximizing energy production should be one of the community's primary operational goals. There are a number of ways to maximize energy revenues including:

(i) generating more electricity by increasing facility throughput through higher steam capacity utilization and/or higher boiler availability;

(ii) generating more electricity by optimizing the efficiency of the power cycle; and/or

(iii) selling a higher percentage of the gross electricity produced by reducing in-plant power consumption.

Since the contract operator has a large degree of control over all of the above factors, consideration is often given to sharing a portion of the net energy revenues with the contract operator as a financial incentive to maximize these revenues. In fact, most of the original WTE service agreements provided for sharing a portion of the net electricity revenues with the contract operator. In the vast majority of these deals, the municipality receives 90 percent of the total net electricity revenues and the contract operator 10 percent. In a few cases, the municipality receives 100 percent of the net electricity revenues up to an annual guarantee with the contract operator receiving significantly more than 10 percent of the revenues from electricity generated in excess of an annual guarantee.

OPERATING EXPERIENCE WITH 10 PERCENT ENERGY REVENUE SHARE

A 10 percent energy revenue share has, for the most part, been adopted as the generally accepted industry standard over the years. However, actual experience over the past 20 years suggests that this approach does not offer enough incentive for the contract operator to optimize energy production. For example, the contract operator is less likely to undertake maintenance and repairs to increase or maintain performance if his share of the incremental revenue is not significantly higher than his cost to undertake the work. Consequently, the community often realizes little return for sharing this portion of the revenue stream. The contract operator, meanwhile, often has to expend little or no effort to realize this revenue and may, in fact, reduce expenses by calculating the economic tradeoffs of the potential savings on maintenance expenses versus the potential loss of incremental energy revenues.

Typical maintenance and repair work that can be susceptible to such economic trade-off analyses as a result of this revenue sharing approach include, for example, the cleaning frequency of steam condensing systems (e.g., surface condensers, cooling towers, air cooled condensers) and the replacement of failed condenser tubes, which are generally capped instead. Deferring this work can end up reducing the efficiency of the power cycle and result in lower energy production. However, if the reduction in the contract operator's share of the electric revenues is less than the savings that the contract operator realizes by deferring maintenance, then the contract operator is economically incentivized to defer the work and reap the economic benefit. Most of the downside of the deferred maintenance is born by the contract community under a 90/10 energy revenue sharing approach.

To illustrate this point, consider the cleaning frequency for an air cooled condenser. Cleaning an air cooled condenser every other month during the summer months has been observed to
result in a one-half inch mercury absolute (0.50 in HgA) increase in the condenser pressure during the months between cleanings, which lowers the steam turbine-generator output by approximately 1.5 percent. For a 30 MW turbine-generator, this results in a decreased output of 324 MWH per month or $16,200 in lost energy revenues based on an energy rate of $0.05/kwh. The community’s share of the lost energy revenues would be $14,580 during each of these months while the contract operator’s lost revenues would only be $1,620. In this case, the contract operator would be unlikely to clean the air cooled condenser monthly since his cleaning costs would most likely exceed his potential additional revenues. However, if the revenue share for excess energy was 50/50, for example, the contract operator’s return would likely justify the additional expense for monthly cleaning and the community’s total energy revenues would also increase.

Additionally, the traditional 90/10 energy revenues split also does not generally provide sufficient incentive for the contract operator to reduce in-plant power consumption through operational and/or process changes such as increasing the efficiency of in-plant electrical loads. In-plant power consumption represents a significant portion of the gross power generated, typically 12-15 percent on large WTE facilities and up to 20 percent on smaller facilities.

ENERGY REVENUE SHARING OPTIONS

There are several potential energy revenue sharing options that are available to a community that will need to enter into a new service agreement in the future including the traditional 90/10 split. The following four options represent a range of different approaches, each with its own merits. A summary of the advantages and disadvantages of each option is provided in Table 1.

Option 1 – No Energy Revenue Sharing

Under this option, 100 percent of the energy revenues would be retained by the community.

Option 2 – Percentage Share of Total Net Energy Revenues

Under this option, the community would share a fixed percentage (e.g., 10 percent) of the total net energy revenues with the contract operator.

Option 3 – Percentage Share of Excess Net Energy Revenues

Under this option, the community would share a fixed percentage (e.g., 50 percent) of the net energy revenues from electricity generated in excess of an annual amount stated in the service agreement.

Option 4 – Energy Credit Based on an Efficiency Factor

Under this option, the community would pay an energy credit to the contract operator for operating in excess of a base efficiency factor (e.g., KWH/ton waste processed, KWH/Klbs steam).

CONCLUSION

In order to maximize energy revenues, it would be in a community’s best interest to share energy revenues with the contract operator. However, based on operating experience over the past 20 years, the widely employed strategy of a 90/10 split may not offer the best incentive.

While payment of an energy credit based on an efficiency factor would tie energy revenue sharing directly to the efficiency of the power cycle, efficiency factors can be affected by conditions outside the control of the contract operator and therefore would not be as fair an approach.

Sharing energy revenues based on excess net revenues (Option 3) would appear to be the best approach because it offers the greatest incentive to the contract operator to maximize energy revenues, particularly if the contract operator’s revenue share of the excess net revenues is 50 percent or higher. Under this option, the contract operator would only share in energy revenues that were realized by exceeding a predetermined annual electricity generation guarantee. This approach ensures that the community receives a minimum amount of energy revenues before the contract operator is eligible for compensation and rewards the contract operator solely for exceeding a minimum threshold. The contract operator would be more likely to undertake additional maintenance and repairs to maximize performance because the potential return on his investment would be much greater. We have proposed this approach in the draft service agreement that was sent to the three prequalified...
contract operators in February 2006 for the Reprocurement of a contract operator for the Pinellas County 3,000 tpd WTE facility. We may have some additional information to report at the conference regarding the wisdom and viability of this approach from the contract operator’s perspective.

REFERENCES

<table>
<thead>
<tr>
<th>Option</th>
<th>Advantage</th>
<th>Disadvantage</th>
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<tbody>
<tr>
<td>1 - No Energy Revenue Sharing</td>
<td>Community retains 100% of revenues</td>
<td>Lack of incentive could lead to lower energy revenues for the community</td>
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<td></td>
<td>No administrative effort</td>
<td>Would likely result in higher service fee since a portion of this revenue stream would not be available to help offset the contract operator's costs and expected profit</td>
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<td>2 - Percentage Share Based on Total Net Energy Revenues</td>
<td>Relatively easy to administer</td>
<td>Minor incentive to maximize electricity generation</td>
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<td>May result in lowest service fee by providing an alternative revenue stream to help offset the contract operator's costs and expected profit</td>
<td>Community retains less than the total energy revenues, thereby causing the community to increase other revenues</td>
</tr>
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<td>3 - Percentage Share Based on Excess Net Energy Revenues</td>
<td>Offers greatest incentive to surpass the stated energy production amount</td>
<td>May result in a higher service fee since this revenue stream may offset less of the contract operator's costs and expected profit</td>
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<td>Community would likely retain more of the total energy revenues</td>
<td>Rewards contract operator for both higher power cycle efficiency and increased throughput, the latter of which the contract operator would also be rewarded if the service fee was based on a per ton processing fee</td>
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<td>Relatively easy to administer</td>
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<td>4 - Energy Credit Based on Efficiency Factor</td>
<td>Ties energy revenue sharing directly to the efficiency of the power cycle and would not reward the contract operator twice for increased throughput under agreements where the service fee was based on a per ton processing fee</td>
<td>Efficiency factors can be affected by conditions outside the control of the contract operator (e.g., refuse heating value, ambient air temperature, etc.)</td>
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<tr>
<td></td>
<td>Community would likely retain more of the total energy revenues</td>
<td>May result in a higher service fee since this lower revenue stream would offset less of the contract operator's costs and expected profit</td>
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