Adjustments to Capacity Payments

(December 4, 2002)

Enclosed is an explanation of the adjustments the Department proposes to the calculations of avoided capacity costs to accommodate for (a) the timing of the contract and (b) the length of the contract.

There are two timing issues to be considered regarding power purchase contracts. First, if a contract for purchase of power starts earlier than the need for capacity, the time value difference between the contract start period and the period when the capacity is needed must be accounted for. Second, the difference in the length of time that the power purchase contract provides capacity and the time for which the capacity is needed must be considered. The equation that addresses both issues is as follows:

(1) $$A2 = \frac{(1+i)^m - 1}{(1+i)^n - 1} * \frac{(1+i)^{n-a} - (1+e)^{n-a}}{(1+i)^m - (1+e)^m} * A1$$

Where:

A1 = Levelized annual value of a capacity purchase at the time of need.

A2 = Levelized annual value of the capacity being paid for in a power purchase contract.

m = Expected lifetime of ordinary (alternative) future capacity addition.

n = Length of power purchase contract.

i = Utility Cost of Capital.

e = Escalation rate affecting value of new capacity additions.

a = Length of time between beginning of contract and time of need for capacity.

The first factor:

$$\frac{(1+i)^m - 1}{(1+i)^n - 1}$$

recognizes the difference between the length of the power purchase contract and the lifetime of the alternative capacity addition. The second factor:

$$\frac{(1+i)^{n-a} - (1+e)^{n-a}}{(1+i)^m - (1+e)^m}$$

recognizes the difference between the time the power purchase contract is executed and the time at which capacity is actually needed.

For example, if m=n (that is, the contract length equals the lifetime of alternative capacity addition) and a=0 (the contract starts at the time additional capacity is needed) equation (1) becomes:

(2) $$A2 = 1 * \frac{(1+i)^n - 1}{(1+i)^n - 1} * \frac{(1+i)^n - (1+e)^n}{(1+i)^n - (1+e)^n} * A1 = 1 * 1 * A1 = A1$$

That is, the levelized annual value of the capacity paid for in a power purchase contract equals the levelized annual value of the alternative capacity purchased at the time of need. So, if the DG contract provides capacity when it is needed for the same length of time as the alternative capacity, there is no need to adjust the avoided capacity cost per kW. That is, the DG owner should be paid the same amount per kW that the utility would pay for the alternative capacity.

If a=0 (the contract starts at the time additional capacity is needed) but m≠n (the contract length differs from the lifetime of alternative capacity), then equation (1) becomes:

$$(3) \qquad A2 = \frac{(1+i)^m - 1}{(1+i)^n - 1} * \frac{(1+i)^n - (1+e)^n}{(1+i)^m - (1+e)^m} * A1$$

So the levelized value of capacity is only adjusted for the difference between the length of the contract and the life of the alternative investment.

As shown in the examples below, the adjustment for adding capacity sooner than is needed is much larger (i.e. decreases the capacity payment) than the adjustment for contract lengths that differ from the lifetime of alternative capacity additions.

<u>Example 1:</u>

Assuming that the levelized annual value of a capacity purchase at the time of need (A1) is $1/kW and:

m = 33 years
n = 20 years
i = 11.5%
e = 4%
a = 7 years

Then:

$$A2 = \frac{(1.115)^{33} - 1}{(1.115)^{20} - 1} * \frac{(1.115)^{13} - (1.04)^{13}}{(1.115)^{33} - (1.04)^{33}} = 0.339$$

Therefore, the appropriate annual capacity value of a contract that is 20 years long compared to 33 years of the alternative capacity addition, and starts seven years before the need for capacity, is about 34% of the annual capacity value of the longer-term capacity determined at the time of need.

However, if the capacity is added when it is needed (rather than prior to that time), the payment is much closer to the annual capacity value of the longer-term capacity determined at the time of need. The following example illustrates this point by using the same difference in length of contract as in Example 1, but assuming that the capacity is added when needed.

<u>Example 2:</u>

Assuming that the levelized annual value of a capacity purchase at the time of need (A1) is $1/kW and:

m = 33 years
n = 20 years
i = 11.5%
e = 4%
a = 0 years

Then:

$$A2 = \frac{(1.115)^{33} - 1}{(1.115)^{20} - 1} * \frac{(1.115)^{20} - (1.04)^{20}}{(1.115)^{33} - (1.04)^{33}} = 0.916$$

The appropriate annual capacity value of a contract that is 20 years long compared to 33 years of the alternative capacity addition, and starts when the capacity is needed, is about 92% of the annual capacity value of the longer-term capacity at the time of need.

The adjustment for the length of the contract is not as great, as indicated in example 3, which uses an extreme case of a 1-year contract and assumes that the capacity is added when needed.

<u>Example 3:</u>

Assuming that the levelized annual value of a capacity purchase at the time of need (A1) is $1/kW and:

m = 33 years
n = 1 year
i = 11.5%
e = 4%
a = 0 years

Then:

$$A2 = \frac{(1.115)^{33} - 1}{(1.115)^{1} - 1} * \frac{(1.115)^{1} - (1.04)^{1}}{(1.115)^{33} - (1.04)^{33}} = 0.705$$

That is, the appropriate annual capacity value of a contract that is only 1 year long compared to 33 years of the alternative capacity addition, and starts when the capacity is needed, is about 71% of the annual capacity value of the longer-term capacity at the time of need.