Expressing California Block & Tier Tariff Information in EMIX

This document describes how an application using the EMIX information model can receive California-style Full Requirements Block & Tier Tariffs, which we abbreviate Block & Tier or BTT) and gives proof of concept as to how the information can be used by any model rich enough to encompass BTT.

We describe the information to determine price, and then how that information is expressed in EMIX 1.0 Public Review 03. Any application that can express Full Requirements Block & Tier Tariff information can use its mapping to directly build a mapping from EMIX to its environment; if the artifacts are expressed in XML in that application environment then an XSLT transformation may be created.

This document does not describe a profile for delivery of BTT information via EMIX.

Description of the Problem

There are two or more Consumption Tiers, determined as a percentage of a baseline number, which in turn is determined by the climate zone of the premises, hence known for each premises.

For concreteness we assume that the baseline value is 1000 kWh, and that the percentage amounts separating the tiers are at 100%, 150%, and 200%, defining four Consumption Tiers.

For premises within a given Consumption Tier there is a price that depends on time of day. We assume that the times are:

- Low 9pm to 10am the next day
- Shoulder 10am to 2pm and 6pm to 9pm
- High 2pm to 6pm

An application might deliver information for varying time ranges; we analyze the information structure and note that the information content for (say) weekends would be expressed similarly.

Scoping of the Problem

To demonstrate mapping to any Premises system that can handle the BTTs it suffices to demonstrate expression of the information model required by those tariffs. We have in effect an array where one dimension is Consumption Tier number and the other is time.

Consumption Tiers are defined by the cut points and identified by numbers 1, 2, 3, and 4 in the following table. Time is defined by intervals. In the illustration the times are described as “Low, Shoulder, and High” in the table.

<table>
<thead>
<tr>
<th>Consumption Tier</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0.10</td>
<td>0.11</td>
<td>0.12</td>
<td>0.13</td>
</tr>
<tr>
<td>Shoulder</td>
<td>0.20</td>
<td>0.25</td>
<td>0.27</td>
<td>0.32</td>
</tr>
<tr>
<td>High</td>
<td>0.30</td>
<td>0.50</td>
<td>0.60</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Price in dollars per kWh
This defines a two-dimension array; an application would find where it is in the Consumption Tiers, then read the price for the current or future time of day. So the key information is exactly that, given the time of day and Consumption Tier, I can tell my current price.

This array is expressed in EMIX, leveraging the structures for demand charges (industrial in the US, residential and industrial in much of the rest of the world), as follows:

1. Each time interval (Low, Shoulder, High) is described as a WS-Calendar Sequence, e.g.
   a. Low: midnight to 10am and 9pm to midnight (two intervals)
   b. Shoulder: 10am to 2pm and 6pm to 9pm (two intervals)
   c. High 2pm to 6pm (two intervals)
2. In the alternative a sequence of intervals can be defined with the appropriate tier information attached (starting at midnight, durations of 10h, 4h, 4h, 3h, 3h)
3. Each time interval has attached to it the sequence of Consumption Tier cut points, expressed as maximumEnergyLevel of the high point.
4. Retrieval algorithm: Select the right time interval for time of day; select the correct consumption tier.

Applications may choose to, and likely will, express this information differently. For example, an array of 60-minute intervals could point to the Consumption Tier structure for that interval. Moreover, an EMIX artifact could express the information in other ways, say with gluons that each reference the Low, Shoulder, and High price tiers respectively.

We are writing only of applications that maintain their own model of a California Block & Tier tariff. Since such an application has a means of interpreting the information model (cut points and time intervals) that application can then describe the mapping from a received EMIX artifact to its own information model.

As a final note, more complex BTTs, say ones with different price levels or consumption levels on weekends or holidays, or seasonal differences can be expressed in the same manner.

**Summary and Conclusions**

We have shown how EMIX can express the information model of a California Block & Tier tariff. Applications that support these tariffs can use their own mapping to take the information from an EMIX expression and store that information in its own data structures.

A concrete mapping can be made directly for any application environment that describes its mapping of the Block & Tier tariffs.

This is the essence of constructing applications using Service Oriented Architectures and integration approaches—the information gets through; how it’s maintained internally is the business of the receiving application. We have demonstrated that such a mapping exists in any application that supports these tariffs.