Q. (response to CA-NP 238) "In Newfoundland Power's view, given the high diversity of customer load profiles in these classes and the high current marginal cost of energy, any proposed rate structure developed would necessarily compromise intra-class fairness in favor of the economic efficiency which results from pricing the tail block to reflect marginal costs." Please provide support for this view with examples.

A. The example provided below compares the use of a Wright-Hopkinson rate structure to the use of a Hopkinson rate structure to recover the same revenue requirement. It demonstrates the intra-class fairness concerns that can result from pricing the tail block to reflect marginal costs.

Assumptions

(1) The rate class is composed of two business customers that compete with each other.
(2) Customer A has a 75 kW monthly maximum demand and Customer B has a 25 kW monthly maximum demand.
(3) Both customers have a monthly load factor of 50% and have the same load shape. Therefore, the average embedded cost per kWh of providing demand and energy to each customer is the same.[1]
(4) The marginal costs on the system, which exceed the embedded costs, are $2 per kW per month and 9¢ per kWh.

Illustrative Wright-Hopkinson Rate Structure

Table 1 provides the illustrative Wright-Hopkinson rate structure to be used in billing each customer.

Table 1
Wright-Hopkinson Rate Structure

Demand Charge	$6 per kW
Energy Charges	
1st 150 kWh per kW	6¢ per kWh
Excess kWh	4¢ per kWh

[1] Customer charges are excluded as the purpose of the example is to demonstrate the effects of the rate structure on the recovery of demand and energy costs.

Table 2 provides the monthly charges and the average price per kWh for each customer and for the customer class.[2]

Table 2
Monthly Charges and Average Price per kWh
Wright-Hopkinson Rate Structure

Customer	Monthly Charge	Average Price per kWh
A	$ 1,770	6.47¢
B	$ 590	6.47¢
Total	**$ 2,360**	**6.47¢**

Table 1 shows that under the illustrative Wright-Hopkinson rate structure the average price per kWh is the same for both customers. This is a fair result given that the average cost per kWh of providing demand and energy to each customer is the same.

Illustrative Hopkinson Rate Structure

A Hopkinson rate structure of $9 per kW and 4¢ per kWh would achieve the same total revenue for the class and the same charges for each customer as the Wright-Hopkinson rate structure presented in Table 1.[3] However, this Hopkinson rate structure would not reflect the assumed system marginal costs.

Marginal Costs on the system exceed the average embedded costs. Modifying the Hopkinson rate structure to reflect system marginal costs would require an inverted price structure to ensure that rates recover no more than the class revenue requirement.

Table 3 provides an inverted Hopkinson rate structure that prices demand and the tail block energy charge at the marginal cost, but recovers the same revenue for the customer class as that provided by the Wright Hopkinson rate structure shown in Table 1. [4]

[2] See Attachment A, Table 1 for detailed calculations.

[3] For example, the energy charges for Customer A under the Wright-Hopkinson rate structure, as shown in Table 1 of Attachment A, total $1,320. At 4¢ per kWh, the energy charge would be 27,375 kWh x 4¢ = $1,095. The $225 difference between these energy charges would, under the Hopkinson rate structure, be recovered by increasing the demand charge to $6 + ($225 ÷ 75 kW) = $9 per kW.

[4] For illustrative purposes, the 1st block size has been set at 8,000 kWh to ensure both customers' marginal energy consumption is priced at the marginal cost. Additionally, the illustrative inverted Hopkinson rate structure assumes the same 1st block size for all customers as it is generally not practical to have a different block size for every customer within rate classes. (In Newfoundland Power's case, its Rate 2.2 and Rate 2.3 classes contain a highly diverse group of customers; there are more than 8,300 customers in Rate 2.2 and more than 1,000 customers in Rate 2.3).

Table 3
Inverted Hopkinson Rate Structure

Demand Charge	$2 per kW
Energy Charges	
1st 8,000 kWh	1.97¢ per kWh
Excess kWh	9.0¢ per kWh

Table 4 provides the monthly charges and the average price per kWh for each customer and for the customer class.[5]

Table 4
Monthly Charges and Average Price per kWh
Inverted Hopkinson Rate Structure

Customer	Monthly Charge	Average Price per kWh
A	$ 2,051	7.49¢ per kWh
B	$ 309	3.38¢ per kWh
Total	**$ 2,360**	**6.47¢ per kWh**

Table 4 shows that under the illustrative inverted Hopkinson rate structure the average price per kWh for Customer A is much higher than that for Customer B. This is because the lower priced block provides a proportionally greater benefit to smaller usage customers within the class than larger usage customers within the class. This is not a fair result given that the average cost per kWh of providing demand and energy to each customer is the same.

[5] See Attachment A, Table 2 for detailed calculations.

Attachment A

Table 1
Calculation of Monthly Charge and Average Price per kWh
Wright-Hopkinson Rate Structure

		Customer A		Customer B	
	Rate	**Usage**	**Charges**	**Usage**	**Charges**
Energy Charges					
1st 150 kWh/kW	6¢ per kWh	11,250[1] kWh	$675	3,750[2] kWh	$225
Excess	4¢ per kWh	16,125 kWh	$645	5,375 kWh	$215
		27,375[3] kWh	$1,320	9,125[4] kWh	$440
Demand Charges	$6 per kW	75 kW	$450	25 kW	$150
Total Monthly Charge			$1,770		$590
Average Price per kWh			6.47¢ per kWh		6.47¢ per kWh

Table 2
Calculation of Monthly Charge and Average Price per kWh
Inverted Hopkinson Rate Structure

		Customer A		Customer B	
	Rate	**Usage**	**Charges**	**Usage**	**Charges**
Energy Charges					
1st 8,000 kWh	1.97¢ per kWh	8,000 kWh	$157	8,000 kWh	$158
Excess	9¢ per kWh	19,375 kWh	$1,744	1,125 kWh	$101
		27,375 kWh	$1,901	9,125 kWh	$259
Demand Charges	$2 per kW	75 kW	$150	25 kW	$50
Total Monthly Charge			$2,051		$309
Average Price per kWh			7.49¢ per kWh		3.38¢ per kWh

[1] 75 kW x 150 kWh = 11,250 kWh.
[2] 25 kW x 150 kWh = 3,750 kWh.
[3] 75 kW x 730 hours in a month x 50% load factor = 27,375 kWh.
[4] 25 kW x 730 hours in a month x 50% load factor = 9,125 kWh.