**Seasonal Inter-Regional Flows for Scenario 1:**

**Version 3 with More Detailed Regional Breakdowns**

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A current issue is that Scenario 1 assumes a large amount of power transfer between major regions, but GE MAPS will commit plants within a region without regard to the expected transfers in or out. This could cause problems for importing regions (committing plants that are not expected to run) and exporting regions (not committing plants that will be needed the next day.) One proposed solution is to establish a firm seasonal commitment amount between major regions to account for the expected flows.

We calculated the flows between the major regions as shown by the blue borders on the flow maps at the end of the paper, except that we included Non-RTO Midwest in the Southeast and we consolidated the two PJM super-regions. Hydro Quebec and Maritimes were separately shown as well. In NEEM, the Summer season is defined as May-September (Blocks 1-10), the Shoulder season as March-April and October-November (Blocks 11-15), and Winter season as December-February (Blocks 16-20).

We calculated the flow both in and out of each region along each pipe and subtracted between these amounts to find the average net flow in GW. These are shown for each season in the table below. The names have been arranged to show the main direction of flow, from the first to the second.

Table 1. Net Inter-regional flows in 2030 for Scenario 1

|  |  |  |  |
| --- | --- | --- | --- |
| **Inter Region**  | **Summer** | **Shoulder** | **Winter** |
| HQ/Maritimes-Northeast |  6.0  |  5.9  |  6.0  |
| HQ/Maritimes-Ontario |  1.2  |  1.2  |  1.3  |
| Ontario-Midwest |  3.6  |  2.7  |  3.0  |
| Midwest-PJM |  16.0  |  21.3  |  23.0  |
| Midwest-Southeast |  1.4  |  3.1  |  5.1  |
| Southwest-Midwest |  0.7  |  7.4  |  6.3  |
| Ontario-Northeast |  2.2  |  1.9  |  2.1  |
| Northeast-PJM |  1.0  |  0.6  |  1.0  |
| PJM-Southeast |  3.4  |  2.5  |  2.0  |
| Southwest-Southeast |  0.2  |  1.6  |  1.6  |

The largest flow is from Midwest to PJM, with higher amounts in the shoulder and winter seasons. Both Ontario and the Southwest send power to the Midwest, with the Southwest power mainly in the shoulder and winter seasons. These higher amounts are likely reflective of both higher wind generation and lower internal demands. PJM passes some of this power on to the Southeast, but most heavily in the summer season with loads are highest. In the shoulder and winter seasons, the Southwest provides more power to the Southeast.

**\*\*Addendum\*\*** At the request of CRA, we further subdivided the Northeast into NYISO and ISONE. We also split the Southeast region into four regions: TVA+Non-RTO Midwest, SOCO, VACAR, and FRCC. The results are shown in Table 2.

Table 2. Net Inter-regional flows in 2030 for Scenario 1

|  |  |  |  |
| --- | --- | --- | --- |
| **Inter Region Flow** | **Summer** | **Shoulder** | **Winter** |
| FRCC-SOCO |  0.07  |  -  |  -  |
| HQ/Maritimes-ISONE |  3.78  |  3.72  |  3.76  |
| HQ/Maritimes-NYISO |  2.24  |  2.15  |  2.28  |
| HQ/Maritimes-Ontario |  1.25  |  1.22  |  1.30  |
| ISONE-NYISO |  1.17  |  0.43  |  0.98  |
| Ontario-Midwest\* |  3.56  |  2.75  |  2.99  |
| Midwest-PJM |  16.00  |  21.34  |  22.96  |
| Southwest-Midwest\* |  0.69  |  7.43  |  6.31  |
| Midwest-TVA |  1.35  |  3.13  |  5.05  |
| Ontario-NYISO\* |  2.22  |  1.88  |  2.06  |
| NYISO-PJM |  1.01  |  0.59  |  1.00  |
| PJM-TVA |  1.67  |  0.39  |  0.30  |
| PJM-VACAR |  1.70  |  2.12  |  1.73  |
| SOCO-TVA |  0.02  |  -  |  -  |
| VACAR-SOCO\* |  0.43  |  0.92  |  0.29  |
| Southwest-SOCO |  0.19  |  1.55  |  1.54  |
| Southwest-TVA |  0.02  |  -  |  0.09  |
| TVA-VACAR |  0.03  |  -  |  0.01  |

\* Labels reversed to show dominant flow, fix from version 2.

The next pages diagram the net flows between each NEEM region for each season. If anyone wants the spreadsheet showing seasonal flows to and from each region, please let me know.



Figure 1. Net Flows for Summer Season



Figure 2. Net Flows for Shoulder Season



Figure 3. Net Flows for Winter Season