# Outlook of Electricity Supply-Demand and Cross-regional Interconnection Lines

- Actual Data up to Fiscal Year 2015 -

August 2016

OCCTO
電力広域的運営推進機関
Organization for Cross-regional Coordination of Transmission Operators,JAPAN

## FORWORD

The Organization shall prepare and publish its Annual Report according to Article 181 of Operational Rules regarding matters specified below.

- Actual data of Electricity Supply-Demand, Network System Utilization, and Network Access Business up to previous fiscal year
- Forecast on Electricity Supply-Demand of following years to mid-through long-term according to aggregated result of Electricity Supply Plans
- Prospects and issues of Electricity Network System

The Organization publishes the actual data of Electricity Supply-Demand and Network System Utilization in advance to the Annual Report due to completion of collecting actual data up to F.Y. 2015.

The contents of this report shall be integrated to the Annual Report subsequently.

(Note)

The text on the Operational Rules is referred from the amended version of July 11, 2016.

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# Chapter I. Actual Electricity Supply and Demand

## 1. Regional Service Areas of 10 General Transmission and Distribution Companies and Definition of Season Period

### (1) Regional Service Areas of 10 General Transmission and Distribution Companies

Regional Service Area means the specified area that General T/D Company transmits the electric energy utilizing Cross-regional Interconnection Lines. There are 10 Regional Service Areas in the Nation shown as Figure 1-1. Regional Service Areas other than Okinawa EPCO are tied with Cross-regional Interconnection Lines.

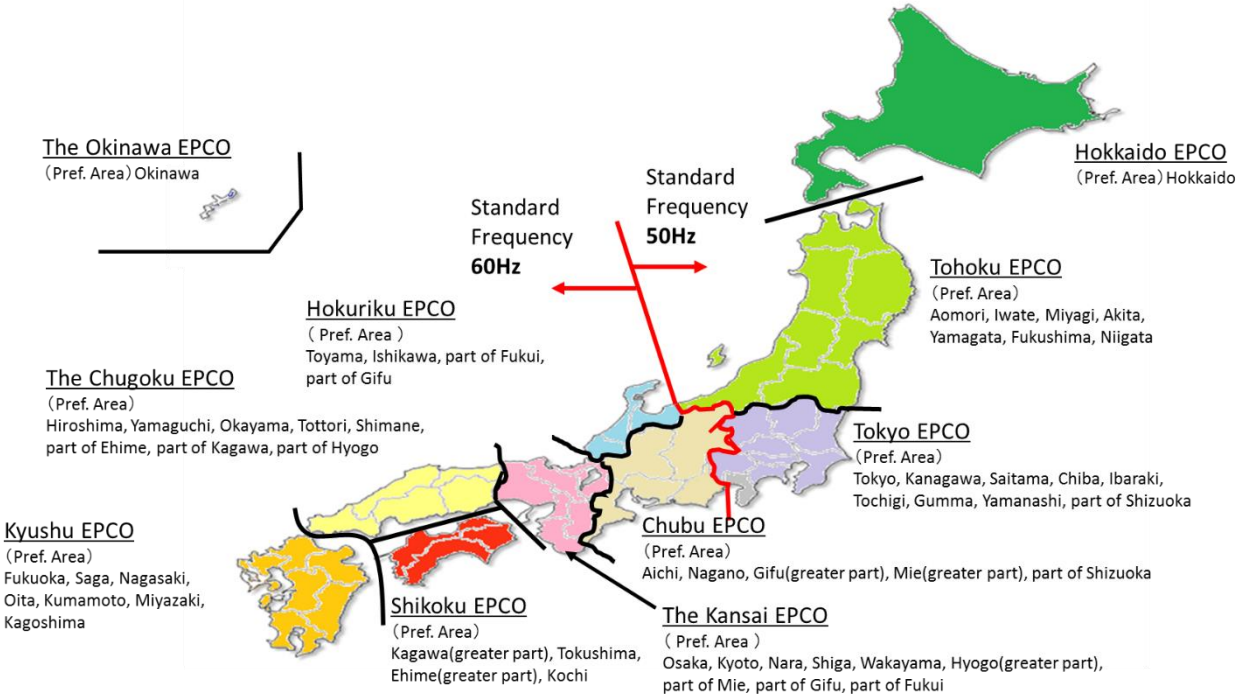



Figure 1-1 10 Regional Service Areas in the Nation and its prefectural distribution

### (2) Definition of Season Period

The report defines the season period as below.

Summer period: from July to September

Winter period: from December to following February

## 2. Outlook of Actual Weather in Nationwide (F.Y. 2015)

### (1)Weather in summer period (June to August)

Table 1-1 shows anomaly of temperature and precipitation ratio from June to August in F.Y. 2015.

- Seasonal mean temperature was significantly above normal in Okinawa/Amami due to extreme hot in June by stronger Pacific High, and above normal in northern Japan due to enlargement of Pacific High in mid-July to early August. However, it was below normal in western Japan where front, typhoon or wet tongue from the south have given greater influence on weather and normal in eastern Japan which had both period of high temperature and low temperature.
- Seasonal precipitation ratio was significantly above normal in the Pacific Sea coast of Western region and Okinawa/Amami where front, typhoon or wet tongue from the south had given greater influence on weather. On the other hand, it was significantly below normal in Japan Sea coast of Eastern region due to lesser rainfall with little influence of Baiu front.

Table 1-1 Anomalies of temperature and rainfall by weathering region from June to August in F.Y. 2015.

| Region | Mean Temperature Anomaly[℃] | Precipitation Ratio[%] |
|---|---|---|
| Northern | +0.6 | 86% |
| Eastern | +0.3 | 116% |
| Western | −0.5 | 132% |
| Okinawa/Amami | +0.6 | 148% |

Source：Japan Meteorological Agency, Tokyo Climate Center
Seasonal Climate Report over Japan for summer F.Y.2015:
http://ds.data.jma.go.jp/tcc/tcc/products/japan/climate/index.php?kikan=3mon&month=8&year=2015
http://www.data.jma.go.jp/gmd/cpd/cgi-bin/view/kikohyo/en.php?kikan=3mon&month=8&year=2015

## (2)Weather in winter period (December to February)

Table 1-2 shows anomaly of temperature, ratio of rainfall and snowfall from December to February in F.Y. 2015.

- In spite of certain period in the latter half of winter has experienced the chill, winter pressure system has not last long and became warm winter through the Nation. Especially, seasonal mean temperatures were significantly above normal in Eastern and Western regions.
- Seasonal precipitation ratio was above normal all over Japan due to low pressure system or front for the shortened winter pressure system. Especially, in Okinawa/Amami it was achieved 188% anomaly with the highest on record since 1947 of statistics available.
- Snowfall for the period were generally small almost through the Japan Sea coast due to shortened winter pressure system except in northern part of Kyushu area where experienced significant snowfall due to strong chill in late January.

Table 1-2 Anomalies of temperature, rainfall and snowfall by weathering region from December to February in F.Y. 2015.

| Region | Mean Temperature Anomaly[℃] | Precipitation Ratio[%] | Snowfall Ratio[%] |
|---|---|---|---|
| Northern | +1.0 | 117% | 72% |
| Eastern | +1.4 | 127% | 54% |
| Western | +1.0 | 164% | 85% |
| Okinawa/Amami | +0.6 | 188% | – |

Source：Japan Meteorological Agency, Tokyo Climate Center
Seasonal Climate Report over Japan for winter F.Y.2015:
http://ds.data.jma.go.jp/tcc/tcc/products/japan/climate/index.php?kikan=3mon&month=2&year=2016
http://www.data.jma.go.jp/gmd/cpd/cgi-bin/view/kikohyo/en.php?kikan=3mon&month=2&year=2016

## 3. Peak Demand in Nationwide*

### (1) Peak Demand in F.Y. 2015

Table 1-3 shows Monthly Peak Demand in Regional Service Areas in F.Y. 2015, Figure 1-2 shows Monthly Peak Demand in Nationwide and ratio over the previous year, and Figure 1-3 shows Annual Peak Demand by Regional Service Areas.

Table 1-3 Monthly Peak Demand in Regional Service Areas in F.Y. 2015 [$10^4$kW, %]

| | | Apr. | May | June | July | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hokkaido | Peak Demand | 429 | 383 | 388 | 441 | 460 | 418 | 435 | 501 | 497 | 516 | 514 | 491 |
| | % change over previous year | (▲7.2) | (▲4.8) | (▲5.6) | (▲1.7) | (▲1.6) | (▲4.5) | (▲5.1) | (+4.1) | (▲8.6) | (▲4.4) | (▲3.0) | (+1.1) |
| Tohoku | Peak Demand | 1,103 | 1,044 | 1,093 | 1,341 | 1,434 | 1,090 | 1,050 | 1,215 | 1,256 | 1,355 | 1,322 | 1,302 |
| | % change over previous year | (+4.9) | (▲0.7) | (▲1.6) | (+4.7) | (+4.1) | (▲1.2) | (▲5.0) | (+0.1) | (▲11.4) | (▲1.3) | (▲5.5) | (▲0.8) |
| Tokyo | Peak Demand | 4,443 | 3,913 | 4,150 | 5,334 | 5,587 | 4,507 | 3,805 | 4,180 | 4,253 | 4,976 | 4,742 | 4,607 |
| | % change over previous year | (+15.9) | (+0.2) | (▲0.9) | (+1.9) | (+3.0) | (+1.5) | (▲9.2) | (▲4.3) | (▲14.9) | (▲2.5) | (▲6.5) | (+2.5) |
| Chubu | Peak Demand | 1,969 | 1,969 | 2,020 | 2,520 | 2,558 | 2,190 | 1,832 | 1,929 | 2,063 | 2,414 | 2,230 | 2,193 |
| | % change over previous year | (+8.5) | (+3.5) | (▲2.1) | (+0.6) | (+3.8) | (+2.7) | (▲9.9) | (▲2.1) | (▲13.4) | (+7.5) | (▲3.2) | (▲2.5) |
| Hokuriku | Peak Demand | 424 | 387 | 419 | 494 | 527 | 422 | 377 | 448 | 475 | 519 | 512 | 495 |
| | % change over previous year | (+8.9) | (▲2.5) | (▲0.8) | (▲2.4) | (+1.6) | (▲3.5) | (▲3.3) | (+5.0) | (▲9.8) | (+4.4) | (▲1.6) | (+0.1) |
| Kansai | Peak Demand | 2,105 | 2,026 | 2,141 | 2,713 | 2,762 | 2,262 | 1,874 | 2,057 | 2,192 | 2,516 | 2,291 | 2,285 |
| | % change over previous year | (+7.6) | (▲0.3) | (▲2.8) | (▲3.6) | (+3.9) | (▲3.2) | (▲11.1) | (▲1.1) | (▲16.4) | (+2.6) | (▲9.3) | (▲4.5) |
| Chugoku | Peak Demand | 804 | 788 | 842 | 1,064 | 1,101 | 877 | 763 | 882 | 946 | 1,111 | 975 | 988 |
| | % change over previous year | (▲0.4) | (▲3.8) | (▲2.2) | (▲1.4) | (+9.1) | (▲2.9) | (▲5.0) | (+4.8) | (▲11.7) | (+10.8) | (▲5.9) | (▲1.0) |
| Shikoku | Peak Demand | 383 | 371 | 398 | 517 | 518 | 417 | 368 | 398 | 432 | 486 | 444 | 437 |
| | % change over previous year | (+4.7) | (▲0.5) | (+3.0) | (▲2.5) | (+5.2) | (▲4.1) | (▲4.7) | (+1.6) | (▲14.7) | (+6.2) | (▲8.9) | (▲6.8) |
| Kyushu | Peak Demand | 1,077 | 1,131 | 1,206 | 1,504 | 1,554 | 1,243 | 1,173 | 1,197 | 1,353 | 1,545 | 1,375 | 1,340 |
| | % change over previous year | (▲2.1) | (▲1.4) | (+3.1) | (▲2.6) | (+8.6) | (▲4.5) | (+1.6) | (+2.0) | (▲8.9) | (+13.0) | (▲5.7) | (▲3.1) |
| Okinawa | Peak Demand | 109 | 127 | 148 | 151 | 147 | 144 | 146 | 123 | 105 | 122 | 112 | 101 |
| | % change over previous year | (+3.9) | (+3.3) | (+0.7) | (+0.8) | (▲2.4) | (▲4.1) | (+7.1) | (+8.8) | (▲0.4) | (+17.4) | (▲1.9) | (▲1.6) |
| Nation wide | Peak Demand | 12,519 | 11,993 | 12,698 | 15,975 | 16,454 | 13,265 | 11,532 | 12,681 | 13,327 | 15,185 | 14,012 | 13,884 |
| | % change over previous year | (+7.9) | (▲0.9) | (+0.2) | (+0.1) | (+6.0) | (▲2.1) | (▲8.0) | (▲1.4) | (▲13.6) | (+2.7) | (▲7.7) | (▲1.6) |

* "Nationwide" means Peak Demand recorded in coincident, not the addition of each regional peak demand.

* Values in red are annual peak demand and values in blue are annual bottom demand in each regional service area.

* Peak Demand refers to the maximum hourly value of electric energy requirement.

* Values are expressed in generating and receiving end, which means the addition of values of the power metered at the generating end of the generation facilities of former vertically integrated electric power companies and values of the power metered at the receiving end of the network supplied to for the customers of the transmission and distribution facilities by the generation facilities of other than vertically integrated electric power companies.

* "Peak Demand" means the most consumed electricity in the given period such as day, month, or year.

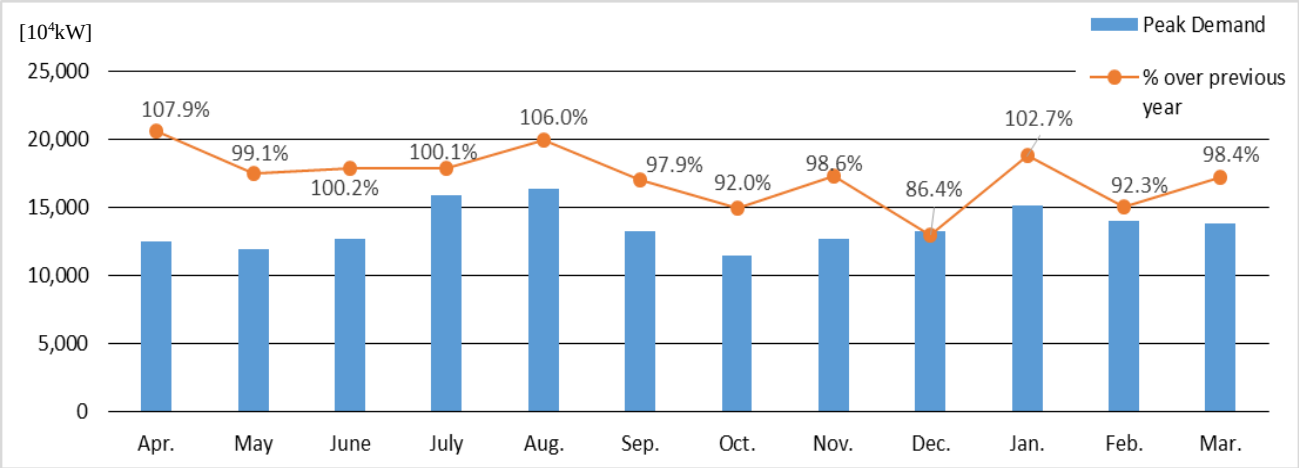



Figure 1-2 Monthly Peak Demand in Nationwide and ratio over the previous year (F.Y. 2015)

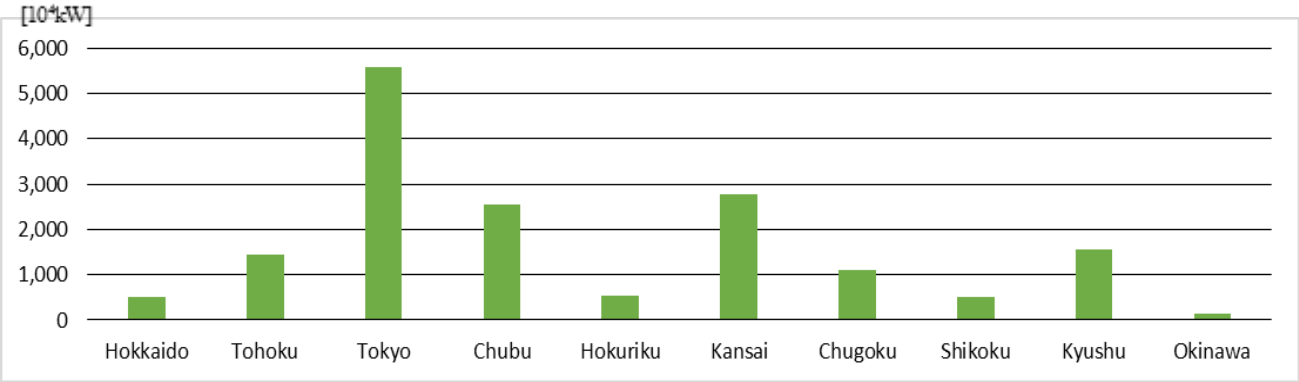



Figure 1-3 Annual Peak Demand by Service Areas (F.Y. 2015)

### (2) Peak Demand in F.Y. 2010～2015

Table 1-4 shows Annual Peak Demand in Regional Service Areas in F.Y. 2010～2015 and Figure 1-4 shows Annual Peak Demand in Nationwide.

Table 1-4 Annual Peak Demand in Regional Service Areas in F.Y. 2010～2015 [$10^4$kW]

| | F.Y.2010 | | F.Y.2011 | | F.Y.2012 | | F.Y.2013 | | F.Y.2014 | | F.Y.2015 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Occurrence | | Occurrence | | Occurrence | | Occurrence | | Occurrence | | Occurrence |
| Hokkaido | 582 | 1/12 | 572 | 2/2 | 558 | 1/18 | 551 | 1/17 | 544 | 12/16 | 516 | 1/18 |
| Tohoku | 1,571 | 8/5 | 1,377 | 2/2 | 1,390 | 1/18 | 1,409 | 2/5 | 1,418 | 12/17 | 1,434 | 8/6 |
| Tokyo | 6,253 | 7/23 | 5,179 | 1/20 | 5,353 | 8/30 | 5,436 | 8/9 | 5,426 | 8/5 | 5,587 | 8/7 |
| Chubu | 2,739 | 8/24 | 2,554 | 8/10 | 2,516 | 7/27 | 2,668 | 8/22 | 2,506 | 7/25 | 2,558 | 8/3 |
| Hokuriku | 573 | 8/5 | 533 | 8/9 | 526 | 8/22 | 527 | 8/19 | 526 | 12/17 | 527 | 8/7 |
| Kansai | 3,198 | 8/19 | 2,888 | 8/9 | 2,774 | 8/3 | 2,923 | 8/22 | 2,813 | 7/25 | 2,762 | 8/4 |
| Chugoku | 1,214 | 8/20 | 1,096 | 8/9 | 1,100 | 8/3 | 1,126 | 8/21 | 1,079 | 7/25 | 1,111 | 1/25 |
| Shikoku | 597 | 8/20 | 544 | 8/9 | 527 | 8/7 | 551 | 8/22 | 531 | 7/25 | 518 | 8/7 |
| Kyushu | 1,756 | 8/20 | 1,558 | 9/1 | 1,532 | 7/26 | 1,647 | 8/20 | 1,543 | 7/25 | 1,554 | 8/6 |
| Okinawa | 148 | 8/3 | 144 | 7/22 | 148 | 7/6 | 153 | 8/8 | 150 | 8/28 | 151 | 7/2 |
| Nationwide | 18,196 | 8/23 | 16,070 | 8/10 | 16,043 | 7/27 | 16,453 | 8/9 | 15,982 | 7/25 | 16,454 | 8/7 |

* "Nationwide" means Peak Demand recorded in coincident, not the addition of each regional peak demand.

* Values in red are maximum annual peak demand for 6 years in each regional service area.

* Peak Demand refers to the maximum hourly value of electric energy requirement.

* Values are expressed in generating and receiving end, which means the addition of values of the power metered at the generating end of the generation facilities of former vertically integrated electric power companies and values of the power metered at the receiving end of the network supplied to for the customers of the transmission and distribution facilities by the generation facilities of other than vertically integrated electric power companies.

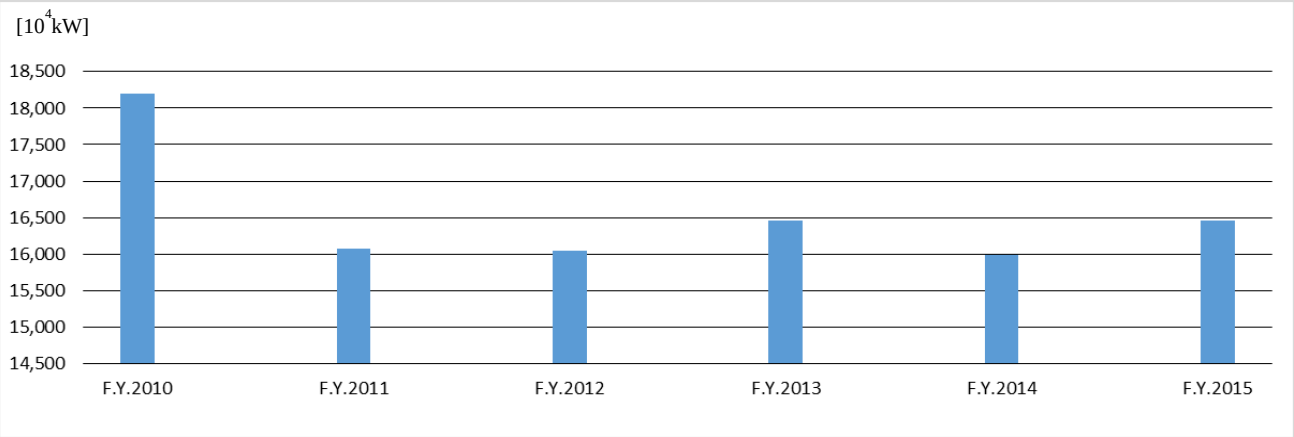



Figure 1-4 Annual Peak Demand in Nationwide (F.Y. 2010～2015)

## 4. Electric Energy Requirement in Nationwide

### (1) Electric Energy Requirement in F.Y.2015

Table 1-5 shows Monthly Electric Energy Requirement in Regional Service Areas in F.Y. 2015, Figure 1-5 shows Monthly Electric Energy Requirement in Nationwide and ratio over the previous year, and Figure 1-6 shows Annual Electric Energy Requirement by Regional Service Areas.

Table 1-5 Monthly Electric Energy Requirement in Regional Service Areas in F.Y. 2015 [GWh, %]

| | | Apr. | May | June | July | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hokkaido | Energy Requirement | 2,543 | 2,361 | 2,331 | 2,524 | 2,577 | 2,425 | 2,617 | 2,798 | 3,179 | 3,362 | 3,126 | 2,962 | 32,803 |
| | % change over previous year | (▲4.8) | (▲4.6) | (▲4.0) | (▲4.7) | (▲2.4) | (▲3.8) | (▲4.0) | (▲0.4) | (▲5.9) | (▲1.8) | (+0.2) | (▲0.9) | (▲3.0) |
| Tohoku | Energy Requirement | 6,429 | 6,155 | 6,246 | 7,093 | 6,996 | 6,202 | 6,430 | 6,705 | 7,595 | 8,287 | 7,693 | 7,444 | 83,275 |
| | % change over previous year | (▲0.8) | (▲1.6) | (▲1.6) | (+2.6) | (▲0.3) | (▲1.5) | (▲0.5) | (▲1.2) | (▲8.8) | (▲0.9) | (▲0.9) | (▲1.1) | (▲1.5) |
| Tokyo | Energy Requirement | 22,291 | 21,824 | 22,620 | 27,041 | 26,787 | 22,707 | 21,913 | 22,186 | 24,959 | 26,921 | 25,181 | 24,755 | 289,186 |
| | % change over previous year | (+1.0) | (▲1.2) | (▲3.0) | (+1.2) | (▲1.1) | (▲0.3) | (▲3.4) | (▲3.0) | (▲8.1) | (▲2.5) | (▲4.0) | (▲1.0) | (▲2.1) |
| Chubu | Energy Requirement | 10,356 | 10,111 | 10,639 | 12,310 | 12,240 | 10,883 | 10,583 | 10,527 | 11,475 | 12,262 | 11,777 | 11,658 | 134,822 |
| | % change over previous year | (+0.4) | (▲1.1) | (▲2.6) | (▲1.5) | (+2.9) | (▲0.6) | (▲1.2) | (▲0.9) | (▲8.6) | (▲2.6) | (▲2.5) | (▲1.2) | (▲1.7) |
| Hokuriku | Energy Requirement | 2,356 | 2,182 | 2,303 | 2,637 | 2,617 | 2,289 | 2,312 | 2,404 | 2,725 | 2,941 | 2,806 | 2,710 | 30,283 |
| | % change over previous year | (+1.4) | (▲1.6) | (▲0.1) | (+0.9) | (+1.5) | (▲2.7) | (▲1.5) | (▲1.6) | (▲10.3) | (▲3.0) | (▲1.6) | (▲2.4) | (▲1.9) |
| Kansai | Energy Requirement | 11,371 | 11,177 | 11,603 | 13,556 | 13,948 | 11,414 | 11,203 | 11,269 | 12,690 | 13,608 | 12,806 | 12,493 | 147,137 |
| | % change over previous year | (▲1.3) | (▲2.4) | (▲3.5) | (▲3.9) | (+1.3) | (▲4.5) | (▲4.6) | (▲3.5) | (▲10.2) | (▲4.7) | (▲4.3) | (▲4.3) | (▲3.9) |
| Chugoku | Energy Requirement | 4,727 | 4,637 | 4,785 | 5,495 | 5,639 | 4,836 | 4,832 | 4,930 | 5,603 | 6,048 | 5,617 | 5,376 | 62,523 |
| | % change over previous year | (▲2.6) | (▲3.6) | (▲3.3) | (▲1.9) | (+3.6) | (▲2.9) | (▲1.6) | (▲1.0) | (▲7.7) | (+0.5) | (▲0.5) | (▲2.5) | (▲1.9) |
| Shikoku | Energy Requirement | 2,190 | 2,128 | 2,238 | 2,551 | 2,641 | 2,200 | 2,176 | 2,204 | 2,486 | 2,705 | 2,529 | 2,473 | 28,521 |
| | % change over previous year | (▲1.1) | (▲1.0) | (+0.7) | (▲2.9) | (+2.4) | (▲3.1) | (▲2.8) | (▲2.5) | (▲10.8) | (▲0.9) | (▲1.7) | (▲2.7) | (▲2.3) |
| Kyushu | Energy Requirement | 6,581 | 6,679 | 6,907 | 7,931 | 8,199 | 6,888 | 6,582 | 6,602 | 7,531 | 8,291 | 7,569 | 7,242 | 87,002 |
| | % change over previous year | (▲0.3) | (▲0.5) | (+0.2) | (▲2.7) | (+2.7) | (▲4.0) | (▲4.0) | (▲3.4) | (▲9.8) | (+1.5) | (▲2.3) | (▲3.7) | (▲2.2) |
| Okinawa | Energy Requirement | 608 | 705 | 848 | 882 | 864 | 793 | 730 | 654 | 620 | 634 | 581 | 599 | 8,519 |
| | % change over previous year | (+4.2) | (+5.0) | (+9.7) | (▲2.0) | (▲2.0) | (▲6.6) | (+1.7) | (+4.8) | (▲0.3) | (+2.4) | (+1.0) | (▲0.1) | (+1.2) |
| Nation wide | Energy Requirement | 69,451 | 67,959 | 70,520 | 82,020 | 82,509 | 70,637 | 69,377 | 70,279 | 78,862 | 85,060 | 79,684 | 77,712 | 904,069 |
| | % change over previous year | (▲0.3) | (▲1.6) | (▲2.3) | (▲0.9) | (+0.8) | (▲2.1) | (▲2.9) | (▲2.3) | (▲8.8) | (▲2.1) | (▲2.8) | (▲2.0) | (▲2.3) |

* Values in red are annual peak energy requirement and values in blue are annual bottom energy requirement in each regional service area.

* Ratio over the previous year in February are adjusted for leap year.

* Values are expressed in generating and receiving end, which means the addition of values of the power metered at the generating end of the generation facilities of former vertically integrated electric power companies and values of the power metered at the receiving end of the network supplied to for the customers of the transmission and distribution facilities by the generation facilities of other than vertically integrated electric power companies.

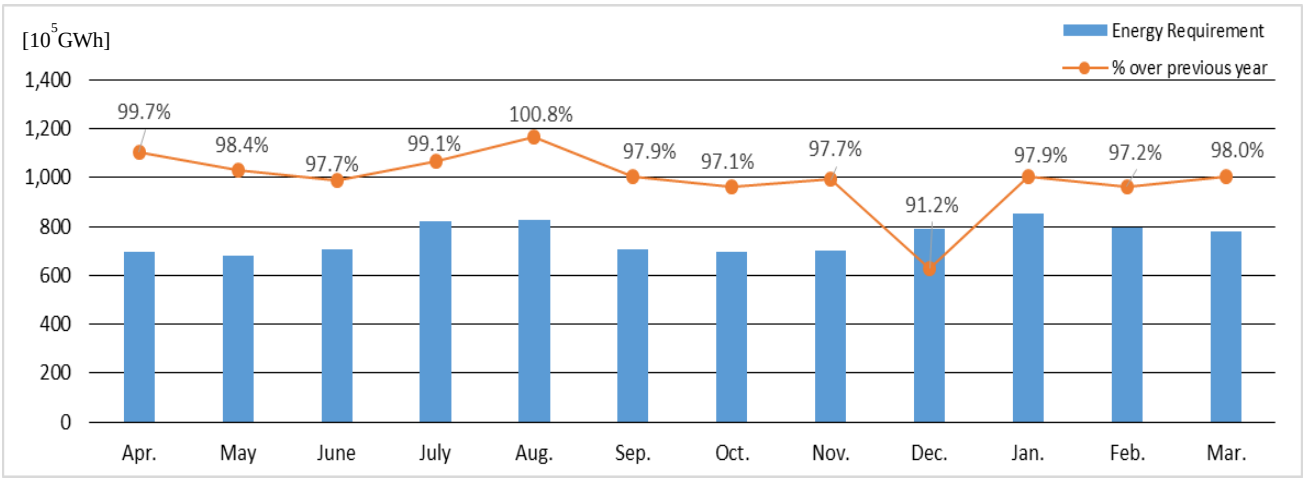



Figure 1-5 Monthly Electric Energy Requirement in Nationwide and ratio over the previous year

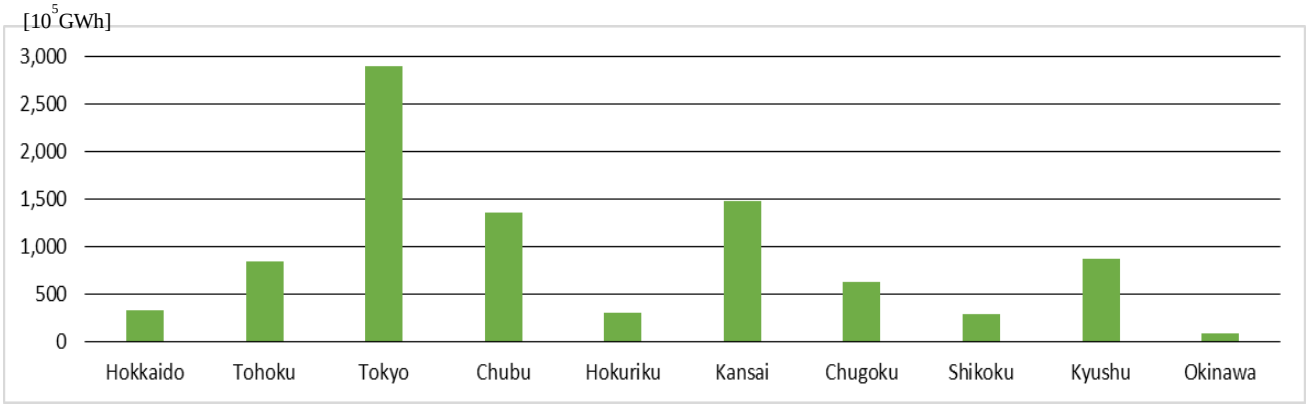



Figure 1-6 Annual Electric Energy Requirement by Regional Service Areas

### (2) Electric Energy Requirement in F.Y. 2010～2015

Table 1-6 shows Annual Electric Energy Requirement in Regional Service Areas in F.Y. 2010～2015 and Figure 1-7 shows Annual Electric Energy Requirement in Nationwide.

Table 1-6 Annual Electric Energy Requirement in Regional Service Areas in F.Y. 2010～2015 [GWh, %]

| | F.Y.2010 | F.Y.2011 | F.Y.2012 | F.Y.2013 | F.Y.2014 | F.Y.2015 |
|---|---|---|---|---|---|---|
| Hokkaido | 36,546 | 36,743 | 35,326 | 34,948 | 33,726 | 32,803 |
| Tohoku | 90,705 | 83,086 | 85,487 | 85,483 | 84,274 | 83,275 |
| Tokyo | 329,393 | 302,615 | 301,669 | 302,882 | 294,726 | 289,186 |
| Chubu | 143,054 | 139,972 | 138,233 | 139,472 | 136,746 | 134,822 |
| Hokuriku | 32,690 | 31,802 | 30,912 | 30,919 | 30,784 | 30,283 |
| Kansai | 169,255 | 163,303 | 157,552 | 156,773 | 152,646 | 147,137 |
| Chugoku | 68,558 | 66,164 | 64,499 | 64,791 | 63,581 | 62,523 |
| Shikoku | 32,484 | 31,561 | 30,200 | 29,932 | 29,107 | 28,521 |
| Kyushu | 95,465 | 92,413 | 89,848 | 90,232 | 88,726 | 87,002 |
| Okinawa | 8,425 | 8,345 | 8,252 | 8,393 | 8,396 | 8,519 |
| Nationwide | 1,006,574 | 956,004 | 941,978 | 938,765 | 922,713 | 904,069 |

* Values in red are annual peak energy requirement and values in blue are annual bottom energy requirement in each regional service area for 6 years.
* Values are expressed in generating and receiving end, which means the addition of values of the power metered at the generating end of the generation facilities of former vertically integrated electric power companies and values of the power metered at the receiving end of the network supplied to for the customers of the transmission and distribution facilities by the generation facilities of other than vertically integrated electric power companies.

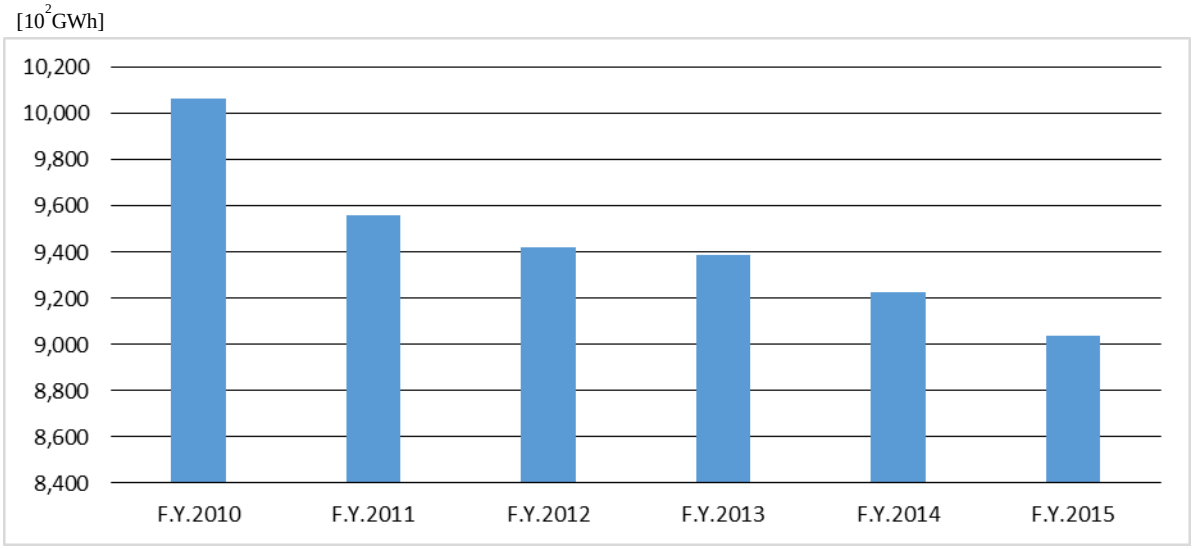



Figure 1-7 Annual Electric Energy Requirement in Nationwide

## 5. Load Factor in Nationwide*

### (1) Load Factor in F.Y.2015

Table 1-7 shows Monthly Load Factor in Regional Service Areas in F.Y. 2015, Figure 1-8 shows Monthly Load Factor in Nationwide and ratio over the previous year, and Figure 1-9 shows Annual Load Factor by Regional Service Areas.

Table 1-7 Monthly Load Factor in Regional Service Areas in F.Y. 2015 [%]

| | Apr. | May | June | July | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hokkaido | 82.3 | 82.9 | 83.5 | 77.0 | 75.3 | 80.6 | 80.9 | 77.5 | 86.0 | 87.5 | 87.4 | 81.1 | **72.3** |
| Tohoku | 81.0 | 79.2 | 79.4 | 71.1 | 65.6 | 79.0 | 82.3 | 76.7 | 81.3 | 82.2 | 83.6 | 76.8 | **66.1** |
| Tokyo | 69.7 | 75.0 | 75.7 | 68.1 | 64.4 | 70.0 | 77.4 | 73.7 | 78.9 | 72.7 | 76.3 | 72.2 | **58.9** |
| Chubu | 73.0 | 69.0 | 73.2 | 65.7 | 64.3 | 69.0 | 77.6 | 75.8 | 74.8 | 68.3 | 75.9 | 71.4 | **60.0** |
| Hokuriku | 77.2 | 75.8 | 76.4 | 71.8 | 66.8 | 75.4 | 82.5 | 74.5 | 77.2 | 76.1 | 78.7 | 73.6 | **65.5** |
| Kansai | 75.0 | 74.1 | 75.3 | 67.2 | 67.9 | 70.1 | 80.4 | 76.1 | 77.8 | 72.7 | 80.3 | 73.5 | **60.6** |
| Chugoku | 81.6 | 79.1 | 78.9 | 69.4 | 68.8 | 76.6 | 85.1 | 77.6 | 79.6 | 73.2 | 82.8 | 73.2 | **64.1** |
| Shikoku | 79.4 | 77.2 | 78.0 | 66.3 | 68.6 | 73.3 | 79.5 | 76.9 | 77.3 | 74.8 | 81.8 | 76.0 | **62.7** |
| Kyushu | 84.9 | 79.4 | 79.5 | 70.9 | 70.9 | 77.0 | 75.4 | 76.6 | 74.8 | 72.1 | 79.1 | 72.6 | **63.7** |
| Okinawa | 77.8 | 74.9 | 79.8 | 78.6 | 79.1 | 76.7 | 67.3 | 73.9 | 79.5 | 69.7 | 74.9 | 80.0 | **64.3** |
| Nationwide | **77.1** | **76.2** | **77.1** | **69.0** | **67.4** | **74.0** | **80.9** | **77.0** | **79.5** | **77.8** | **81.7** | **75.2** | **62.6** |

* "Nationwide" means Load Factor calculated for the whole Japan, not the average of each regional Load Factor.

* Values in red are annual least load factor in each regional service area.

$$\text{* Monthly Load Factor(\%)} = \frac{\text{Monthly Energy Requirement}}{\text{Monthly Peak Demand}\times\text{calendar hours (24h}\times\text{monthly days)}}$$

$$\text{* Annual Load Factor(\%)} = \frac{\text{Annual Energy Requirement}}{\text{Annual Peak Demand}\times\text{calendar hours (24h}\times\text{annual days)}}$$

* Values are expressed in generating and receiving end, which means the addition of values of the power metered at the generating end of the generation facilities of former vertically integrated electric power companies and values of the power metered at the receiving end of the network supplied to for the customers of the transmission and distribution facilities by the generation facilities of other than vertically integrated electric power companies.

* "Load Factor" means the ratio of average demand to peak demand in given period.

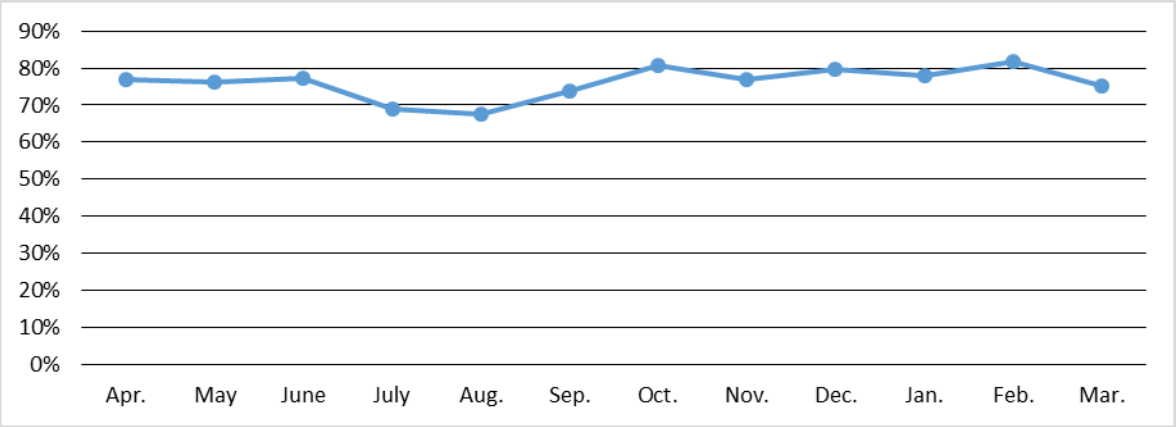



Figure 1-8 Monthly Load Factor in Nationwide and ratio over the previous year

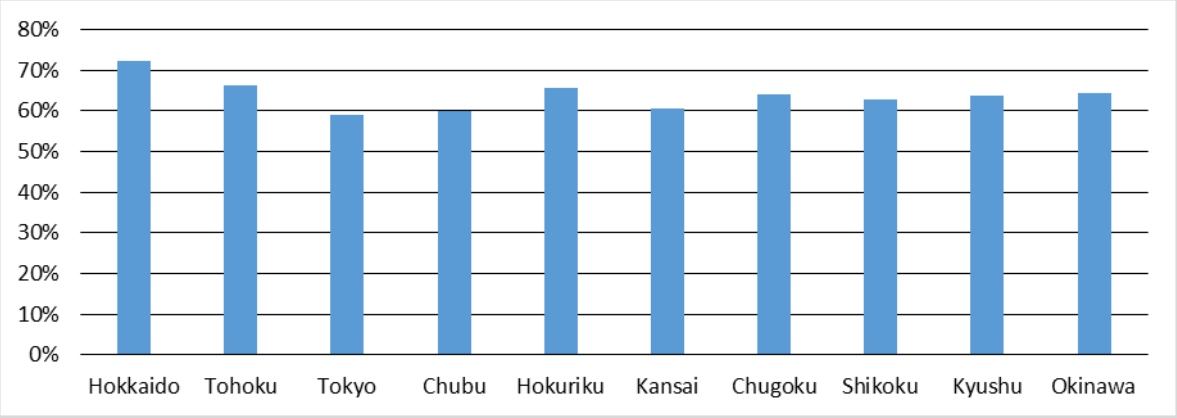



Figure 1-9 shows Annual Load Factor by Regional Service Areas

### (2) Load Factors in F.Y. 2010～2015

Table 1-8 shows Annual Load Factor in Regional Service Areas in F.Y. 2010～2015 and Figure 1-10 shows Annual Load Factor in Nationwide.

Table 1-8 Annual Load Factor in Regional Service Areas in F.Y. 2010～2015 [%]

| | F.Y.2010 | F.Y.2011 | F.Y.2012 | F.Y.2013 | F.Y.2014 | F.Y.2015 |
|---|---|---|---|---|---|---|
| Hokkaido | 71.6 | 73.2 | 72.2 | 72.5 | 70.8 | 72.3 |
| Tohoku | 65.9 | 68.7 | 70.2 | 69.3 | 67.9 | 66.1 |
| Tokyo | 60.1 | 66.5 | 64.3 | 63.6 | 62.0 | 58.9 |
| Chubu | 59.6 | 62.4 | 62.7 | 59.7 | 62.3 | 60.0 |
| Hokuriku | 65.1 | 67.9 | 67.0 | 67.0 | 66.8 | 65.5 |
| Kansai | 60.4 | 64.4 | 64.8 | 61.2 | 61.9 | 60.6 |
| Chugoku | 64.5 | 68.7 | 66.9 | 65.7 | 67.3 | 64.1 |
| Shikoku | 62.2 | 66.0 | 65.5 | 62.1 | 62.6 | 62.7 |
| Kyushu | 62.1 | 67.5 | 66.9 | 62.5 | 65.6 | 63.7 |
| Okinawa | 65.0 | 65.8 | 63.5 | 63.0 | 63.7 | 64.3 |
| Nationwide | 63.1 | 67.7 | 67.0 | 65.5 | 65.9 | 62.6 |

* "Nationwide" means Load Factor calculated for the whole Japan, not the average of each regional Load Factor.

* Values in red are annual least load factor in each regional service area for 6 years.

* Annual Load Factor(%) $= \dfrac{\text{Annual Energy Requirement}}{\text{Annual Peak Demand} \times \text{calendar hours(24h} \times \text{annual days)}}$

* Values are expressed in generating and receiving end, which means the addition of values of the power metered at the generating end of the generation facilities of former vertically integrated electric power companies and values of the power metered at the receiving end of the network supplied to for the customers of the transmission and distribution facilities by the generation facilities of other than vertically integrated electric power companies.

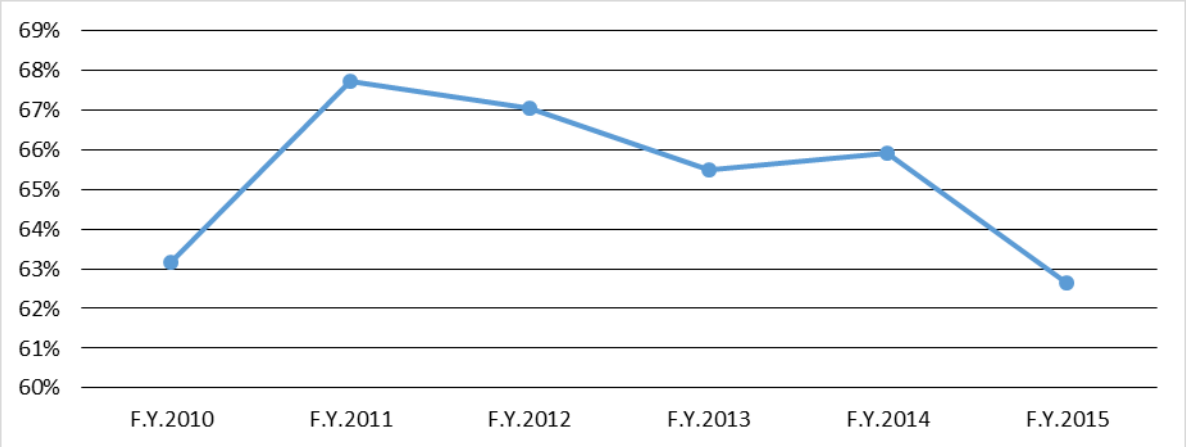



Figure 1-10 Annual Load Factor in Nationwide in F.Y.2010～2015

## 6. State of Supply and Demand in Nationwide on the Peak Demand Day

### (1) State of Demand and Supply in Nationwide on the Summer Peak Demand Day (July to September)

Table 1-9 shows State of Demand and Supply on the Summer Peak Demand Day in Regional Service Areas in F.Y. 2015 and Figure 1-11 shows Daily Load Curve in Nationwide at the Summer Peak Demand.

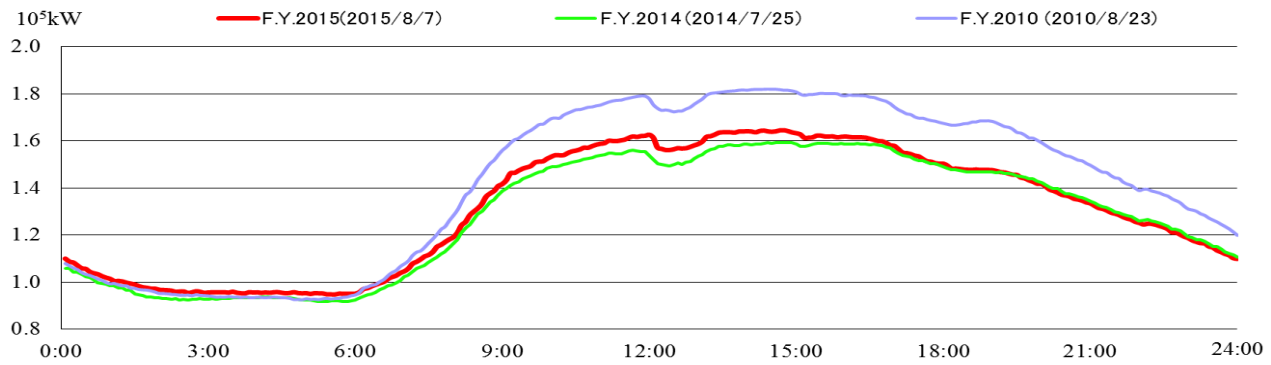
Table 1-9 State of Demand and Supply on the Summer Peak Demand Day in Regional Service Areas in F.Y. 2015

| | F.Y.2015 | | | | | | | | | All-Time-Record | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Peak Demand [$10^4$kW] | Occurrence date & time | | | Daily Max. Temperature [℃] | Supply Capacity [$10^4$kW] | Reserve Margin [$10^4$kW] | Reserve Margin [%] | Daily Energy Supply [$10^4$kWh] | Daily Load Factor [%] | Peak Demand [$10^4$kW] | Occurrence date & time | | | Daily Max. Temperature [℃] | Daily Energy Supply [$10^4$kWh] | Daily Load Factor [%] |
| Hokkaido | 460 | 8/5 | Wed | 12 | 34.5 | 570 | 110 | 23.8 | 9,416 | 85.3% | 512 | 2008/9/22 | Mon | 19 | 26.2 | 9,947 | 80.9% |
| Tohoku | 1,434 | 8/6 | Thu | 15 | 36.1 | 1,632 | 198 | 13.8 | 27,620 | 80.3% | 1,571 | 2010/8/5 | Thu | 15 | 32.6 | 30,264 | 80.3% |
| Tokyo | 5,587 | 8/7 | Fri | 15 | 37.7 | 5,942 | 355 | 6.4 | 106,119 | 79.1% | 6,339 | 2007/8/22 | Wed | 15 | 37.0 | 119,557 | 78.6% |
| Chubu | 2,558 | 8/3 | Mon | 15 | 36.4 | 2,766 | 208 | 8.1 | 46,513 | 75.8% | 2,839 | 2008/8/5 | Tue | 15 | 37.8 | 52,823 | 77.5% |
| Hokuriku | 527 | 8/7 | Fri | 12 | 33.6 | 600 | 74 | 14.0 | 10,167 | 80.5% | 573 | 2010/8/5 | Thu | 15 | 37.6 | 11,105 | 80.7% |
| Kansai | 2,762 | 8/4 | Tue | 15 | 36.3 | 3,191 | 429 | 15.5 | 53,134 | 80.2% | 3,198 | 2010/8/19 | Thu | 15 | 36.6 | 60,612 | 79.0% |
| Chugoku | 1,101 | 8/6 | Thu | 15 | 35.5 | 1,220 | 119 | 10.8 | 21,327 | 80.7% | 1,236 | 2007/8/17 | Fri | 15 | 36.5 | 23,330 | 78.7% |
| Shikoku | 518 | 8/7 | Fri | 17 | 35.7 | 561 | 43 | 8.4 | 9,871 | 79.4% | 599 | 2008/8/4 | Mon | 15 | 35.8 | 11,313 | 78.7% |
| Kyushu | 1,554 | 8/6 | Thu | 17 | 35.5 | 1,756 | 202 | 13.0 | 30,927 | 82.9% | 1,778 | 2008/8/1 | Fri | 15 | 34.9 | 34,093 | 79.9% |
| Okinawa | 151 | 7/2 | Thu | 12 | 32.8 | 219 | 68 | 45.1 | 3,096 | 85.5% | 154 | 2009/8/3 | Mon | 21 | 34.4 | 3,210 | 86.7% |
| Nation wide | 16,454 | 8/7 | Fri | 15 | — | 18,346 | 1,892 | 11.5 | 316,473 | 80.1% | 18,221 | 2007/8/22 | Wed | 15 | — | 347,819 | 79.5% |

* Daily Maximum Temperatures are provided by the Japan Metrological Agency and based on the data for the city of the headquarters of General T/D Companies are launched. (Except for Okinawa EPCO, data for Naha applied. Those data are beyond April 2005.)

* Daily Load Factor(%) $= \dfrac{\text{Daily Energy Requirement}}{\text{Daily Peak Demand} \times 24\text{h}}$

* Values are expressed in generating and receiving end, which means the addition of values of the power metered at the generating end of the generation facilities of former vertically integrated electric power companies and values of the power metered at the receiving end of the network supplied to for the customers of the transmission and distribution facilities by the generation facilities of other than vertically integrated electric power companies.




*For comparison with the data before the Great Eastern Earthquake, data of F.Y.2010 is added as reference.

Figure 1-11 Daily Load Curve in Nationwide at the Summer Peak Demand

## (2) State of Demand and Supply in Nationwide on the Winter Peak Demand Day (December to February)

Table 1-10 shows State of Demand and Supply on the Winter Peak Demand Day in Regional Service Areas in F.Y. 2015 and Figure 1-12 shows Daily Load Curve in Nationwide at the Winter Peak Demand.

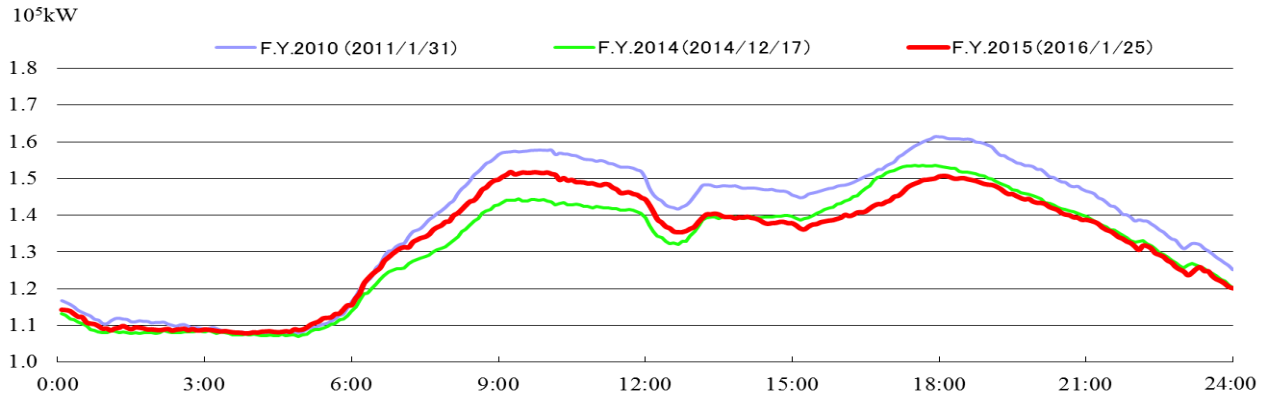
Table 1-10 State of Demand and Supply on the Winter Peak Demand Day in Regional Service Areas in F.Y. 2015

| | F.Y.2015 | | | | | | | | | All-Time-Record | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Peak Demand [$10^4$kW] | Occurrence date & time | | | Daily Mean Temperature [℃] | Supply Capacity [$10^4$kW] | Reserve Margin [$10^4$kW] | Reserve Margin [%] | Daily Energy Supply [$10^4$kWh] | Daily Load Factor [%] | Peak Demand [$10^4$kW] | Occurrence & time | | | Daily Mean Temperature [℃] | Daily Energy Supply [$10^4$kWh] | Daily Load Factor [%] |
| Hokkaido | 516 | 1/18 | Mon | 18 | −5.9 | 653 | 137 | 26.5 | 11,837 | 95.5% | 582 | 2011/1/12 | Wed | 18 | −6.8 | 12,730 | 91.1% |
| Tohoku | 1,355 | 1/25 | Mon | 18 | −0.9 | 1,530 | 175 | 12.9 | 29,671 | 91.3% | 1,491 | 2008/1/24 | Thu | 18 | 0.1 | 30,874 | 86.3% |
| Tokyo | 4,976 | 1/18 | Mon | 12 | 2.8 | 5,377 | 401 | 8.1 | 98,704 | 82.7% | 5,666 | 2008/1/23 | Wed | 18 | 3.0 | 112,696 | 82.9% |
| Chubu | 2,414 | 1/25 | Mon | 10 | 0.1 | 2,576 | 162 | 6.7 | 47,535 | 82.1% | 2,483 | 2008/2/14 | Thu | 10 | 2.0 | 50,327 | 84.5% |
| Hokuriku | 519 | 1/19 | Tue | 18 | 0.1 | 560 | 41 | 7.8 | 11,333 | 90.9% | 528 | 2011/1/20 | Thu | 18 | 0.5 | 11,576 | 91.3% |
| Kansai | 2,516 | 1/25 | Mon | 10 | 1.9 | 2,902 | 386 | 15.3 | 52,061 | 86.2% | 2,747 | 2011/2/14 | Mon | 17 | 1.8 | 55,132 | 83.6% |
| Chugoku | 1,111 | 1/25 | Mon | 10 | 0.8 | 1,239 | 129 | 11.6 | 23,023 | 86.4% | 1,104 | 2008/1/28 | Mon | 18 | 1.6 | 22,812 | 86.1% |
| Shikoku | 486 | 1/19 | Tue | 19 | 2.9 | 545 | 58 | 12.0 | 10,171 | 87.2% | 522 | 2012/2/2 | Thu | 19 | 0.8 | 10,799 | 86.2% |
| Kyushu | 1,545 | 1/25 | Mon | 11 | 2.1 | 1,871 | 326 | 21.1 | 31,945 | 86.1% | 1,545 | 2012/2/2 | Thu | 19 | −0.1 | 31,425 | 84.7% |
| Okinawa | 122 | 1/24 | Sun | 20 | 9.2 | 164 | 42 | 34.1 | 2,390 | 81.4% | 114 | 2011/1/31 | Mon | 20 | 11.8 | 2,230 | 81.4% |
| Nation wide | 15,185 | 1/25 | Mon | 10 | — | 17,689 | 2,503 | 16.5 | 317,826 | 87.2% | 16,140 | 2008/2/13 | Wed | 19 | — | 333,390.8 | 86.1% |

* Daily Mean Temperatures are provided by the Japan Metrological Agency and based on the data for the city of the headquarters of General T/D Companies are launched. (Except for Okinawa EPCO, data for Naha applied. Those data are beyond April 2005.)

* Daily Load Factor(%) $= \dfrac{\text{Daily Energy Requirement}}{\text{Daily Peak Demand} \times 24\text{h}}$

* Values are expressed in generating and receiving end, which means the addition of values of the power metered at the generating end of the generation facilities of former vertically integrated electric power companies and values of the power metered at the receiving end of the network supplied to for the customers of the transmission and distribution facilities by the generation facilities of other than vertically integrated electric power companies.




*For comparison with the data before the Great Eastern Earthquake, data of F.Y.2010 is added as reference.

Figure 1-12 Daily Load Curve in Nationwide at the Winter Peak Demand

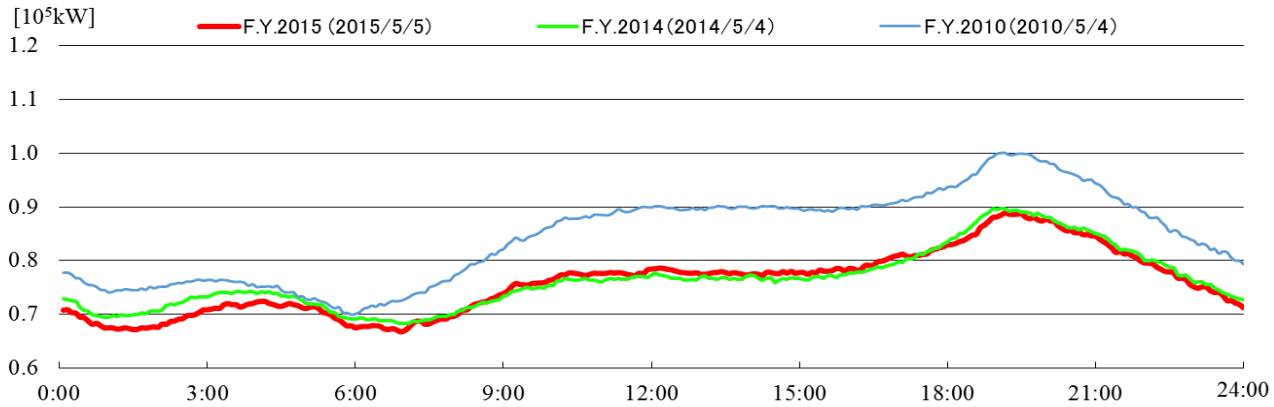
## 7. Bottom Demand Day in Nationwide

Table 1-11 shows State of the Bottom Demand Day in Regional Service Areas in F.Y. 2015 and Figure 1-13 shows Daily Load Curve in Nationwide at the Bottom Demand.

Table 1-11 Bottom Demand Day in Regional Service Areas in F.Y. 2015

| | F.Y.2015 | | | | | |
|---|---|---|---|---|---|---|
| | Bottom Demand [$10^4$kW] | Occurrence date & time | | | Daily Mean Temperature [℃] | Daily Energy Supply [$10^4$kWh] |
| Hokkaido | 258 | 5/24 | Sun | 8 | 14.5 | 6,905 |
| Tohoku | 637 | 5/5 | Tue | 1 | 15.9 | 17,049 |
| Tokyo | 2,095 | 5/6 | Wed | 6 | 18.2 | 62,095 |
| Chubu | 895 | 5/5 | Tue | 7 | 19.1 | 24,798 |
| Hokuriku | 205 | 5/4 | Mon | 1 | 19.6 | 5,512 |
| Kansai | 1,085 | 5/6 | Wed | 7 | 20.1 | 31,392 |
| Chugoku | 486 | 5/5 | Tue | 1 | 18.8 | 12,841 |
| Shikoku | 205 | 5/6 | Wed | 8 | 19.3 | 5,901 |
| Kyushu | 677 | 10/26 | Mon | 1 | 18.0 | 21,139 |
| Okinawa | 61 | 1/2 | Sat | 7 | 20.2 | 1,798 |
| Nation wide | 6,771 | 5/5 | Tue | 7 | – | 183,134 |

* Daily Mean Temperatures are provided by the Japan Metrological Agency and based on the data for the city of the headquarters of General T/D Companies are launched. (Except for Okinawa EPCO, data for Naha applied. Those data are beyond April 2005.)
* Values are expressed in generating and receiving end, which means the addition of values of the power metered at the generating end of the generation facilities of former vertically integrated electric power companies and values of the power metered at the receiving end of the network supplied to for the customers of the transmission and distribution facilities by the generation facilities of other than vertically integrated electric power companies.




*For comparison with the data before the Great Eastern Earthquake, data of F.Y.2010 is added as reference.

Figure 1-13 Daily Load Curve in Nationwide at the Bottom Demand

## 8. Peak Daily Energy Supply in Nationwide

Table 1-12 shows Summer Peak Daily Energy Supply in Regional Service Areas in F.Y. 2015(July to September) and Table 1-13 shows Winter Peak Daily Energy Supply in Regional Service Areas in F.Y. 2015(December to February).

Table 1-12 Summer Peak Daily Energy Supply in Regional Service Areas in F.Y. 2015

| | F.Y.2015 | | | | All-Time-Record | | | |
|---|---|---|---|---|---|---|---|---|
| | Daily Energy Supply [$10^4$kWh] | Occurrence date | | Daily Mean Temperature [℃] | Daily Energy Supply [$10^4$kWh] | Occurrence date | | Daily Mean Temperature [℃] |
| Hokkaido | 9,416 | 8/5 | Wed | 27.9 | 10,491 | 2010/8/6 | Fri | 28.8 |
| Tohoku | 27,620 | 8/6 | Thu | 30.9 | 30,264 | 2010/8/5 | Thu | 28.5 |
| Tokyo | 106,260 | 8/6 | Thu | 30.9 | 119,557 | 2007/8/22 | Wed | 31.7 |
| Chubu | 48,279 | 8/4 | Tue | 30.7 | 53,020 | 2008/7/25 | Fri | 31.0 |
| Hokuriku | 10,293 | 8/6 | Thu | 30.0 | 11,105 | 2010/8/5 | Thu | 31.6 |
| Kansai | 53,196 | 8/5 | Wed | 31.6 | 60,612 | 2010/8/19 | Thu | 31.6 |
| Chugoku | 21,327 | 8/6 | Thu | 30.6 | 23,648 | 2008/8/5 | Tue | 30.2 |
| Shikoku | 9,941 | 7/31 | Fri | 31.1 | 11,419 | 2010/8/20 | Fri | 31.3 |
| Kyushu | 30,941 | 8/7 | Fri | 31.3 | 34,093 | 2008/8/1 | Fri | 30.5 |
| Okinawa | 3,142 | 7/8 | Wed | 30.4 | 3,210 | 2009/8/3 | Mon | 31.1 |
| Nation wide | 317,881 | 8/6 | Thu | - | 346,213 | 2010/8/24 | Tue | - |

Table 1-13 Winter Peak Daily Energy Supply in Regional Service Areas in F.Y. 2015

| | F.Y.2015 | | | | All-Time-Record | | | |
|---|---|---|---|---|---|---|---|---|
| | Daily Energy Supply [$10^4$kWh] | Occurrence date | | Daily Mean Temperature [℃] | Daily Energy Supply [$10^4$kWh] | Occurrence date | | Daily Mean Temperature [℃] |
| Hokkaido | 11,837 | 1/18 | Mon | -5.9 | 12,997 | 2011/1/7 | Fri | -8.9 |
| Tohoku | 29,671 | 1/25 | Mon | -0.9 | 31,513 | 2011/1/20 | Thu | -0.3 |
| Tokyo | 98,704 | 1/18 | Mon | 2.8 | 112,696 | 2008/1/23 | Wed | 3.0 |
| Chubu | 47,592 | 1/20 | Wed | 2.3 | 50,327 | 2008/2/14 | Thu | 2.0 |
| Hokuriku | 11,333 | 1/19 | Tue | 0.1 | 11,584 | 2011/1/27 | Thu | 0.3 |
| Kansai | 52,061 | 1/25 | Mon | 1.9 | 55,230 | 2011/1/31 | Mon | 1.6 |
| Chugoku | 23,023 | 1/25 | Mon | 0.8 | 23,098 | 2008/1/29 | Tue | 3.4 |
| Shikoku | 10,342 | 1/25 | Mon | 2.1 | 10,830 | 2011/1/31 | Mon | 1.4 |
| Kyushu | 31,945 | 1/25 | Mon | 1.2 | 32,045 | 2011/1/18 | Tue | 3.0 |
| Okinawa | 2,443 | 1/25 | Mon | 10.4 | 2,235 | 2011/1/12 | Wed | 13.0 |
| Nation wide | 317,826 | 1/25 | Mon | - | 333,391 | 2008/2/13 | Wed | - |

* Daily Mean Temperatures are provided by the Japan Metrological Agency and based on the data for the city of the headquarters of General T/D Companies are launched. (Except for Okinawa EPCO, data for Naha applied. Those data are since April 2005.)
* Values are expressed in generating and receiving end, which means the addition of values of the power metered at the generating end of the generation facilities of former vertically integrated electric power companies and values of the power metered at the receiving end of the network supplied to for the customers of the transmission and distribution facilities by the generation facilities of other than vertically integrated electric power companies.

## 9. Actual Instruction by the Organization

According to Provisions of Paragraph 1 of Article 28-44 of the Electricity Business Act, the Organization may, when it finds it necessary to improve the status regarding electricity supply and demand, instruct members such as Electric Power Companies to undertake the actions, if the status regarding electricity supply and demand for Electricity Business conducted by a member has worsened or is likely to worsen.

In F.Y.2015, the Organization has implemented the instruction of power exchange twice as stated in Table 1-14, according to item1 to 3, paragraph 1 of Article 111 of the Operational Rules.

Besides, according to item4 to 5, paragraph 1 of Article 111, the Organization shall give instructions to the member to lend and deliver, borrow or share electrical facilities to/from/ with the members and to take necessary steps to improve the supply-demand state, in addition to the instructions, however, there were no actual instructions.

Table 1-14 Actual Instruction by the Organization in F.Y.2015

| | | |
|---|---|---|
| ① | Date | April 8, 2015 at 17:30 |
| | Instruction | ・Chubu EPCO shall supply to Tokyo EPCO 600MW of electricity from 18:00 till 21:00.<br>・Tohoku EPCO shall supply to Tokyo EPCO 400MW of electricity from 18:00 till 21:00.<br>・Tokyo EPCO shall be supplied 1,000MW of electricity by Chubu EPCO and Tohoku EPCO from 18:00 till 21:00. |
| | Reason | State of supply-demand might be worsen without power exchange through Cross-regional interconnection lines due to demand increase by temperature drop in regional service area of Tokyo EPCO. |
| ② | Date | September 26, 2015 at 16:30 |
| | Instruction | ・Chugoku EPCO shall supply to Shikoku EPCO 500MW of electricity in Maximum from 17:30 till 22:00.<br>・Shikoku EPCO shall be supplied 500MW of electricity in Maximum by Chugoku EPCO from 17:30 till 22:00. |
| | Reason | State of supply-demand might be worsen without power exchange through Cross-regional interconnection lines due to demand increase by hot weather in service area of Shikoku EPCO. |

## 10. Output Shedding of Renewable Energy Generating Facilities Dispatched by the General Transmission and Distribution Companies

General Transmission and Distribution Companies may dispatch Renewable Energy Generating Facilities to shed their output in case of expected oversupply to their demand after shedding the output of generators other than Renewable Energy Generating Facilities according to the provision of "Ministerial Ordinance of Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources by Electric Utilities".

Table 1-15 shows Actual Dispatch of Output Shedding of Renewable Energy Generating Facilities in F.Y.2015.

Table 1-15 Actual Dispatch of Output Shedding of Renewable Energy Generating Facilities in F.Y.2015

| Regional Service Area | Output Shedding Period | Total capacity of Shed instruction | Reason |
|---|---|---|---|
| Kyushu EPCO (Tanegashima) | Tuesday(holiday),May 5, 2015 from 9:00 till 16:00 | 1,000kW | Possible insufficiency of ability to reduce power supply*1 is expected. |
| Kyushu EPCO (Tanegashima) | Sunday, Feb. 21, 2016 from 9:00 till 16:00 | 1,000kW | |
| Kyushu EPCO (Tanegashima) | Saturday, Mar. 12, 2016 from 9:00 till 16:00 | 900kW | |
| Kyushu EPCO (Tanegashima) | Sunday, Mar. 20, 2016 from 9:00 till 16:00 | 2,544kW | |
| Kyushu EPCO (Tanegashima) | Monday(holiday),Mar. 21, 2016 from 9:00 till 16:00 | 1,680kW | |
| Kyushu EPCO (Tanegashima) | Tuesday, Mar. 22, 2016 from 9:00 till 16:00 | 1,000kW | |
| Kyushu EPCO (Tanegashima) | Monday, Mar. 28, 2016 from 9:00 till 16:00 | 1,650kW | |

*1 "Insufficient ability to reduce the power supply" shall mean the case where balancing capacity for redundancy becomes insufficient in regional service areas, and the members who are General Transmission and Distribution Companies cannot resolve the surplus of electricity even by suppression of output from power generators that are not able to be adjusted on line.

*2 "Balancing capacity for redundancy" shall mean balancing capacity to suppress supply or increase the demand for electricity when the amount of supply exceeds the demand in regional service areas.

## Chapter II. Actual Utilization of Cross-regional Interconnection Lines

### 1. Cross-regional Interconnection Lines and their management

#### (1) Cross-regional Interconnection Lines

"Cross-regional Interconnection Lines" means transmission lines with 250 kV or more and AC/DC convertors that firmly connect regional service areas of the members who are General Transmission and Distribution Companies. Electric power supply beyond each service areas is available through the Interconnection Lines. The Organization shall instruct to supply electricity through the Cross-regional Interconnection Lines and secure the supply-demand balance when supply capability of each regional service area falls short. Figure 2-1 and Table2-1 show the Cross-regional Interconnection Lines in Japan.

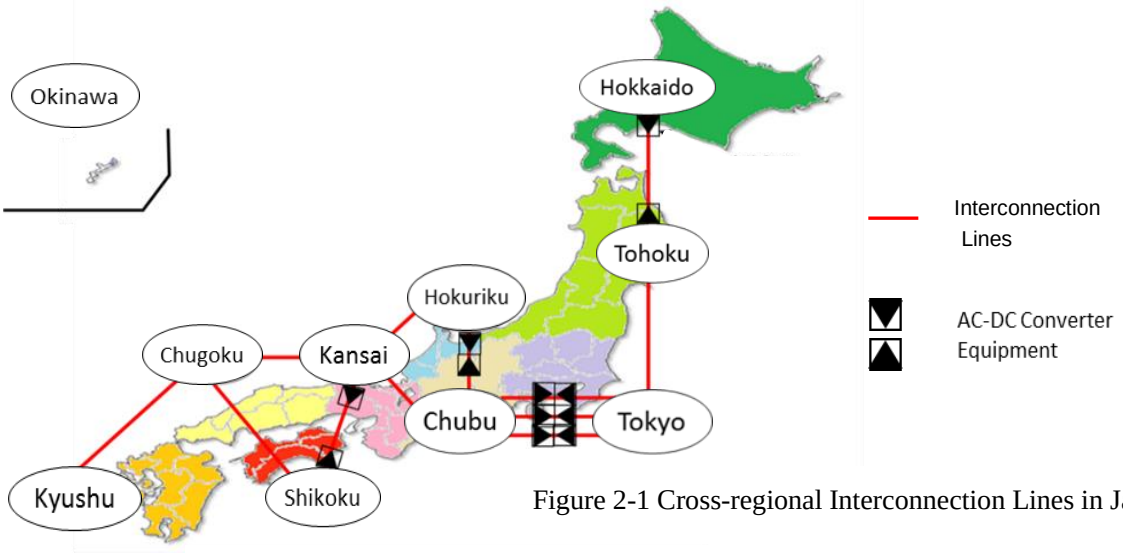



Figure 2-1 Cross-regional Interconnection Lines in Japan

Table2-1 Cross-regional Interconnection Lines

| Interconnection Lines | Areas・Directions | | | | Corresponding Facilities | AC/DC |
|---|---|---|---|---|---|---|
| Interconnection facilities between Hokkaido and Honshu | Forward | Hokkaido | → | Tohoku | Interconnection facilities between Hokkaido and Honshu AC/DC C.S. | DC |
| | Counter | Tohoku | → | Hokkaido | | |
| Interconnection line between Tohoku and Tokyo | Forward | Tohoku | → | Tokyo | Soma-Futaba bulk line | AC |
| | Counter | Tokyo | → | Tohoku | | |
| Interconnection facilities between Tokyo and Chubu | Forward | Tokyo | → | Chubu | Sakuma FC<br>Shin Shinano FC<br>Higashi Shimizu FC | DC |
| | Counter | Chubu | → | Tokyo | | |
| Interconnection line between Chubu and Kansai | Forward | Chubu | → | Kansai | Mie-Higashi Omi line | AC |
| | Counter | Kansai | → | Chubu | | |
| Interconnection facilities between Chubu and Hokuriku | Forward | Chubu | → | Hokuriku | Interconnection facilities of Minami Fukumitsu HVDC BTB C.S.and Minami Fukumitsu Substation | DC |
| | Counter | Hokuriku | → | Chubu | | |
| Interconnection line between Hokuriku and Kansai | Forward | Hokuriku | → | Kansai | Echizen-Reinan line | AC |
| | Counter | Kansai | → | Hokuriku | | |
| Interconnection lines between Kansai and Chugoku | Forward | Kansai | → | Chugoku | Seiban-Higashi Okayama line, Yamazaki-Chizu line | AC |
| | Counter | Chugoku | → | Kansai | | |
| Interconnection facilities between Kansai and Shikoku | Forward | Kansai | → | Shikoku | Interconnection facilities between Kihoku and Anan AC/DC C.S. | DC |
| | Counter | Shikoku | → | Kansai | | |
| Interconnection line between Chugoku and Shikoku | Forward | Chugoku | → | Shikoku | Honshi interconnection line | AC |
| | Counter | Shikoku | → | Chugoku | | |
| Interconnection line between Chugoku and Kyushu | Forward | Chugoku | → | Kyushu | Kanmon interconnection line | AC |
| | Counter | Kyushu | → | Chugoku | | |

### (2) Management of Cross-regional Interconnection Lines

The Organization shall manage the Interconnection Lines according to the Operational Rules by the following procedures.

(a)Establishing TTC*1 and Transmission Margin*2

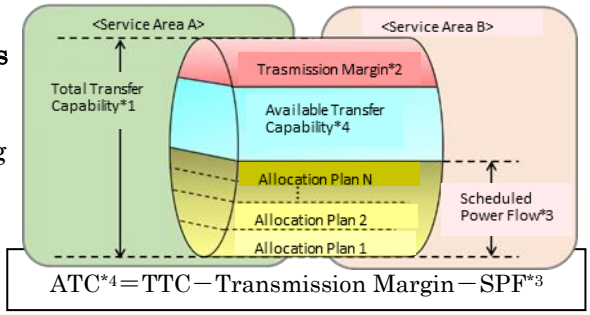



Figure 2-2 Management of Interconnection Lines

(b)Management of SPF of Interconnection Line

i. The Organization shall receive the submission of a plan specifying the capability to utilize for desired Interconnection Line (hereinafter, "Request Plan") and deliver them to the General T/D Companies route related to the Interconnection Lines (hereinafter, "Relevant General T/D Companies).

ii. The Organization shall judge whether the Request Plans of the Interconnection Line is acceptable for registration for the Scheduled Power Flow (such judgment shall be called "Determination of Transfer Capability Allocation" hereinafter). There are "Forward Flow" and "Counter Flow" in "Capability Allocation Plan". However, actual flows on the transmission lines are an offset of each direction. Thus, Scheduled Power Flow are the offset figure between "Forward Flow" and "Counter Flow", not the simple addition of each direction.

iii. When the Organization determined that the Request Plans of the Interconnection Lines are acceptable for transmission upon the Determination of Transfer Capability Allocation, it shall register such plans for a Scheduled Power Flow (shall be called "Capability Registration").

iv. When the Organization conducts the Capability Registration, it shall notify the applicants for interconnection use and the Relevant General T/D Companies (Request Plan of the Interconnection Lines of which Capability Registration was conducted shall be called "Capability Allocation Plan of the Interconnection Lines")

(c)Revision & Change of Capability Allocation Plan

(d)Congestion Management

When congestion occurs on the interconnection line, the Organization shall take steps to dissolve the congestion with respect to Capability Allocation Plans and reported figures registered for a Scheduled Power Flow. When the Organization manage the congestion, it shall notify the users of the interconnection lines having such decreased Capability Allocation Plan of the Interconnection Line or reported figure and Relevant General T/D Company about the decreased cross-section and the capability.

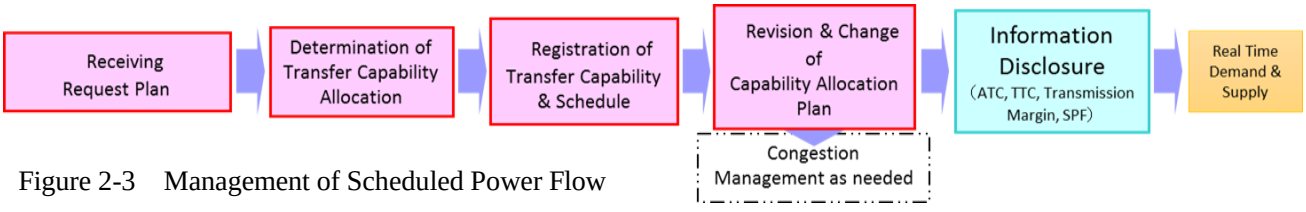



Figure 2-3 Management of Scheduled Power Flow

*1 "Total Transfer Capability (TTC)" shall mean the maximum electricity that can be sent to the distribution facilities while securing supply reliability without damaging the transmission and distribution facilities.

*2 "Transmission Margin" shall mean the capability of electricity managed by the Organization as a part of TTC of the interconnection lines to receive electricity from other regional service areas through interconnection lines under abnormal states of electric network, supply shortage or other emergent states, to keep stabilizing the electric network, or to develop an environment of market trading of electricity.

*3 "Scheduled Power Flow" shall mean the capacity of electricity managed by the Organization as a sum of the capability registered by users of the interconnection lines.

*4 "Available Transfer Capability (ATC)"shall mean the capability of Total Transfer Capability (TTC) of the interconnection lines managed by the Organization less the capability secured for Transmission Margin, Scheduled Power Flow, and Cross-regional Frequency Control.

*5 "Congestion" shall mean a state where the ATC becomes negative.

## 2. Actual Utilization of Cross-regional Interconnection Lines

Followings are actual utilization of Cross-regional Interconnection Lines managed according to the provision of the Article 124 of the Operational Rules.

### (1) Actual Utilization of Cross-regional Interconnection Lines in F.Y. 2015

Table 2-2 and Figure 2-4 show Monthly Utilization of Cross-regional Interconnection Lines in Regional Service Areas in F.Y. 2015.

Table 2-2 Monthly Utilization of Cross-regional Interconnection Lines in Regional Service Areas in F.Y. 2015

[GWh]

| Interconnection | direction | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hokkaido - Honshu | →Tohoku (Forward) | 25 | 6 | 12 | 18 | 16 | 10 | 6 | 7 | 6 | 10 | 6 | 22 | 146 |
| | →Hokkaido (Counter) | 23 | 40 | 48 | 53 | 47 | 54 | 36 | 100 | 97 | 96 | 137 | 72 | 804 |
| Tohoku-Tokyo | →Tokyo (Forward) | 1,789 | 1,712 | 1,887 | 2,068 | 2,325 | 1,788 | 1,878 | 1,781 | 1,798 | 1,875 | 1,854 | 1,832 | 22,587 |
| | →Tohoku (Counter) | 123 | 151 | 201 | 375 | 377 | 322 | 306 | 371 | 432 | 441 | 365 | 248 | 3,714 |
| Tokyo-Chubu | →Chubu (Forward) | 34 | 63 | 123 | 170 | 169 | 19 | 21 | 19 | 9 | 19 | 18 | 29 | 693 |
| | →Tokyo (Counter) | 248 | 282 | 276 | 519 | 527 | 417 | 283 | 340 | 412 | 424 | 425 | 359 | 4,513 |
| Chubu-Kansai | →Kansai (Forward) | 201 | 258 | 425 | 398 | 383 | 230 | 343 | 204 | 176 | 151 | 208 | 435 | 3,412 |
| | →Chubu (Counter) | 480 | 359 | 565 | 810 | 793 | 850 | 491 | 618 | 697 | 680 | 717 | 515 | 7,577 |
| Chubu-Hokuriku | →Hokuriku (Forward) | 16 | 10 | 4 | 9 | 9 | 5 | 0 | 0 | 4 | 30 | 11 | 10 | 108 |
| | →Chubu (Counter) | 15 | 10 | 5 | 39 | 31 | 16 | 6 | 2 | 13 | 13 | 12 | 10 | 172 |
| Hokuriku - Kanasai | →Kansai (Forward) | 71 | 160 | 91 | 311 | 216 | 349 | 259 | 184 | 165 | 64 | 44 | 133 | 2,047 |
| | →Hokuriku (Counter) | 20 | 20 | 28 | 37 | 37 | 35 | 35 | 34 | 37 | 129 | 59 | 33 | 502 |
| Kansai-Chugoku | →Chugoku (Forward) | 193 | 150 | 130 | 63 | 78 | 44 | 114 | 30 | 31 | 56 | 29 | 30 | 948 |
| | →Kansai (Counter) | 514 | 514 | 728 | 950 | 926 | 939 | 670 | 767 | 854 | 722 | 805 | 749 | 9,138 |
| Kansai-Shikoku | →Shikoku (Forward) | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| | →Kansai (Counter) | 474 | 490 | 572 | 975 | 981 | 926 | 852 | 905 | 886 | 954 | 918 | 677 | 9,611 |
| Chugoku-Shikoku | →Shikoku (Forward) | 99 | 226 | 337 | 362 | 361 | 286 | 310 | 304 | 299 | 331 | 289 | 220 | 3,423 |
| | →Chugoku (Counter) | 208 | 226 | 223 | 522 | 428 | 601 | 517 | 376 | 389 | 351 | 469 | 323 | 4,631 |
| Chugoku-Kyushu | →Kyushu (Forward) | 312 | 263 | 195 | 147 | 201 | 172 | 209 | 103 | 119 | 198 | 151 | 104 | 2,174 |
| | →Chugoku (Counter) | 571 | 1,053 | 1,402 | 1,546 | 1,519 | 1,265 | 1,172 | 1,238 | 1,340 | 1,410 | 1,315 | 1,115 | 14,947 |

* Based on the Scheduled Power Flow of Cross-regional Interconnection Lines, the values are before offset.
* Values in red are annual maximum capabilities and values in blue are annual minimum capabilities in each lines and directions.


Figure 2-4 Monthly Utilization of Cross-regional Interconnection Lines in Regional Service Areas in F.Y. 2015

### (2) Actual Utilization of Cross-regional Interconnection Lines in F.Y. 2010～2015

Table 2-3 and Figure 2-5 show Annual Utilization of Cross-regional Interconnection Lines in Regional Service Areas in F.Y.2010～2015.

Table 2-3 Annual Utilization of Cross-regional Interconnection Lines in Regional Service Areas in F.Y. 2010～2015

[GWh]

| Interconnection | direction | F.Y.2010 | F.Y.2011 | F.Y.2012 | F.Y.2013 | F.Y.2014 | F.Y.2015 |
|---|---|---|---|---|---|---|---|
| Hokkaido-Honshu | →Tohoku (Forward) | 972 | 3,925 | 214 | 182 | 143 | 146 |
| | →Hokkaido (Counter) | 12 | 7 | 673 | 505 | 617 | 804 |
| Tohoku-Tokyo | →Tokyo (Forward) | 27,519 | 9,454 | 16,084 | 22,450 | 21,273 | 22,587 |
| | →Tohoku (Counter) | 12,219 | 5,674 | 4,520 | 3,891 | 4,029 | 3,714 |
| Tokyo-Chubu | →Chubu (Forward) | 188 | 1,151 | 1,579 | 2,829 | 2,702 | 693 |
| | →Tokyo (Counter) | 1,271 | 2,426 | 1,288 | 536 | 2,755 | 4,513 |
| Chubu-Kansai | →Kansai (Forward) | 943 | 3,734 | 7,487 | 7,049 | 7,131 | 3,412 |
| | →Chubu (Counter) | 10,721 | 8,403 | 5,726 | 4,928 | 6,342 | 7,577 |
| Chubu-Hokuriku | →Hokuriku (Forward) | 117 | 169 | 452 | 170 | 231 | 108 |
| | →Chubu (Counter) | 2,310 | 130 | 183 | 310 | 296 | 172 |
| Hokuriku-Kanasai | →Kansai (Forward) | 4,957 | 1,127 | 1,590 | 1,406 | 2,265 | 2,047 |
| | →Hokuriku (Counter) | 2,850 | 730 | 464 | 587 | 491 | 502 |
| Kansai-Chugoku | →Chugoku (Forward) | 1,423 | 1,483 | 2,836 | 2,326 | 2,252 | 948 |
| | →Kansai (Counter) | 7,916 | 10,520 | 6,788 | 5,468 | 5,994 | 9,138 |
| Kansai-Shikoku | →Shikoku (Forward) | 0 | 0 | 208 | 0 | 1 | 2 |
| | →Kansai (Counter) | 9,299 | 9,810 | 8,938 | 9,073 | 9,362 | 9,611 |
| Chugoku-Shikoku | →Shikoku (Forward) | 2,502 | 3,475 | 3,575 | 3,583 | 2,677 | 3,423 |
| | →Chugoku (Counter) | 7,496 | 6,727 | 3,564 | 3,694 | 3,912 | 4,631 |
| Chugoku-Kyushu | →Kyushu (Forward) | 903 | 2,582 | 4,210 | 3,838 | 3,596 | 2,174 |
| | →Chugoku (Counter) | 13,095 | 13,905 | 13,596 | 13,847 | 11,218 | 14,947 |

* Based on the Scheduled Power Flow of Cross-regional Interconnection Lines

* Values in red are annual maximum capabilities and values in blue are annual minimum capabilities in each lines and directions for 6 years.

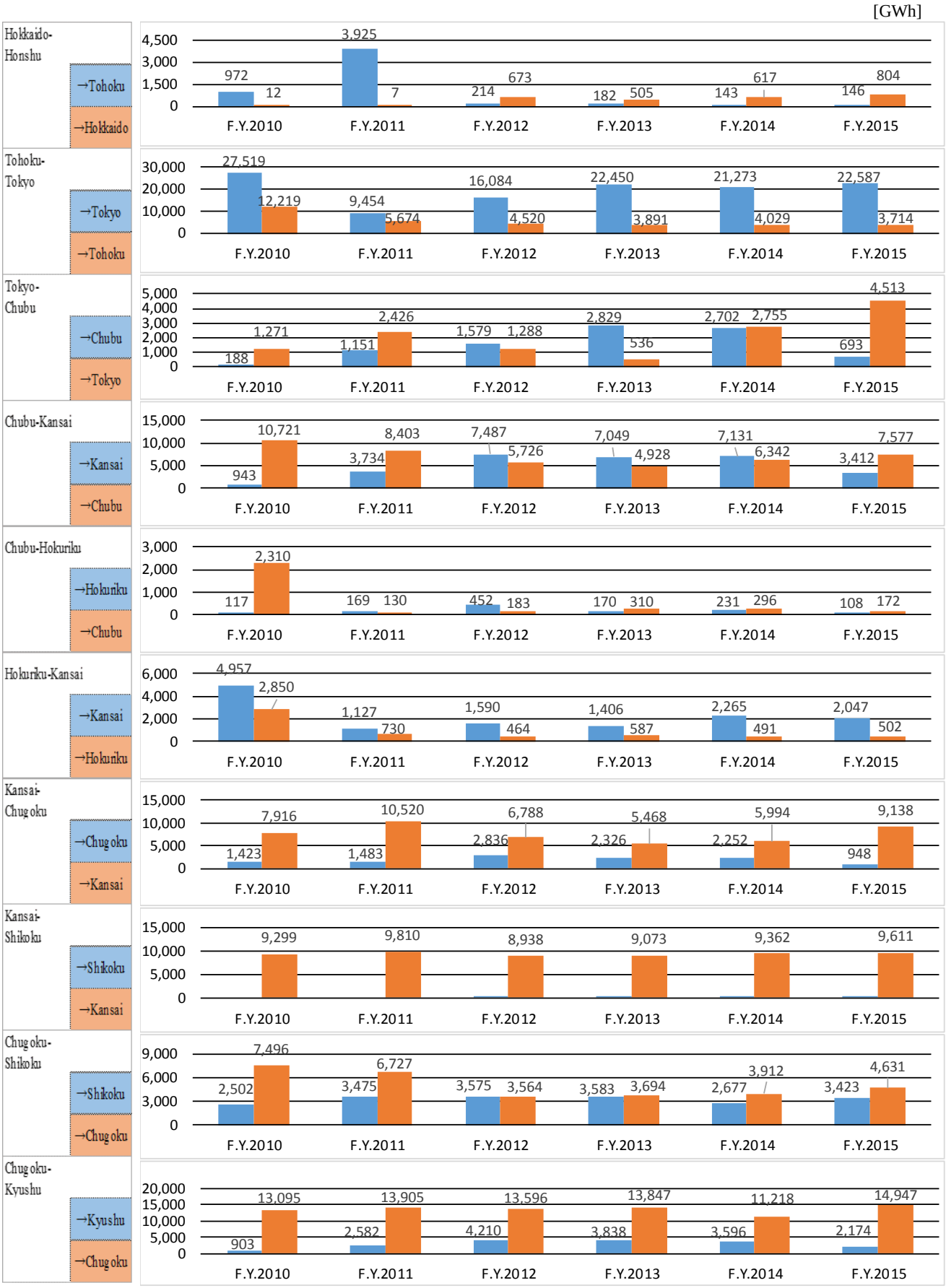



Figure 2-5 Annual Utilization of Cross-regional Interconnection Lines in Regional Service Areas in F.Y.2010～2015

### (3) Monthly Utilization of Cross-regional Interconnection Lines by Transaction in F.Y.2015

Table 2-4 shows Monthly Utilization of Cross-regional Interconnection Lines by Transaction in F.Y.2015.

Table 2-4 Monthly Utilization of Cross-regional Interconnection Lines by Transaction in F.Y.2015 [GWh]

| | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bi-lateral | 4,342 | 4,867 | 6,238 | 7,723 | 7,890 | 6,720 | 6,186 | 6,266 | 6,577 | 6,814 | 6,654 | 5,670 | 75,947 |
| Day-ahead | 920 | 958 | 842 | 1,473 | 1,346 | 1,375 | 1,115 | 947 | 1,013 | 1,003 | 1,079 | 1,083 | 13,152 |
| Hour-ahead | 155 | 168 | 173 | 178 | 190 | 233 | 209 | 169 | 174 | 139 | 101 | 162 | 2,050 |

* Values in red are annual maximum capabilities and values in blue are annual minimum capabilities.

### (4) Annual Utilization of Cross-regional Interconnection Lines by Transaction in F.Y.2010～2015

Table 2-5, Figure 2-6, 2-7 and 2-8 show Annual Utilization of Cross-regional Interconnection Lines by Transaction in F.Y.2010～2015.

Table 2-5 Annual Utilization of Cross-regional Interconnection Lines by Transaction in F.Y.2010～2015 [GWh]

| | F.Y.2010 | F.Y.2011 | F.Y.2012 | F.Y.2013 | F.Y.2014 | F.Y.2015 |
|---|---|---|---|---|---|---|
| Bi-lateral | 100,444 | 79,693 | 76,328 | 73,289 | 71,558 | 75,947 |
| Day-ahead | 6,251 | 5,718 | 7,155 | 11,632 | 14,174 | 13,152 |
| Hour-ahead | 2 | 22 | 493 | 1,750 | 1,554 | 2,050 |

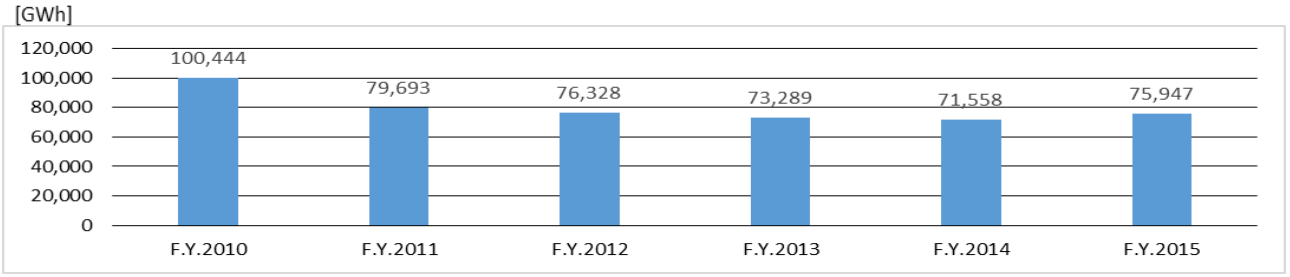



Figure 2-6 Annual Utilization of Cross-regional Interconnection Lines by Bilateral Transaction in F.Y.2010～2015

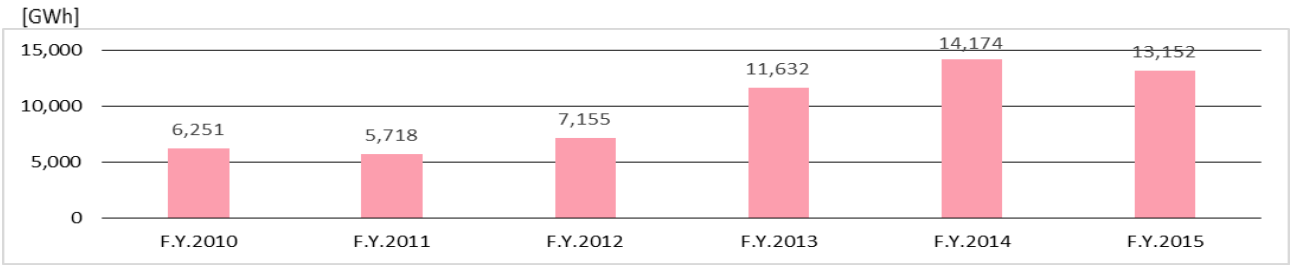



Figure 2-7 Annual Utilization of Cross-regional Interconnection Lines by Day-ahead Transaction in F.Y.2010～2015

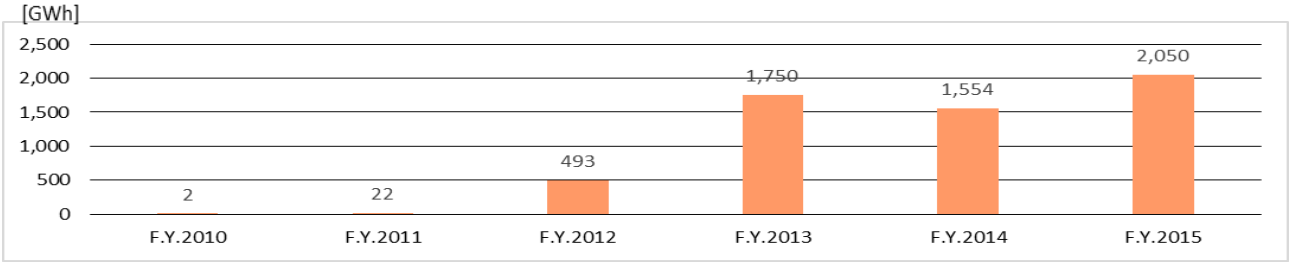



Figure 2-8 Annual Utilization of Cross-regional Interconnection Lines by Hour-ahead Transaction in F.Y.2010～2015

## 3. Congestion Management and Constraints of Cross-regional Interconnection Lines in F.Y.2015

Followings are actual Congestion Management and Constraints of Cross-regional Interconnection Lines implemented according to the provision of the Article 143 of the Operational Rules.

### (1) Monthly Congestion Management of Cross-regional Interconnection Lines by Weekly Plan Submission in F.Y.2015

Table 2-6 shows Monthly Managed Congestion of Cross-regional Interconnection Lines by the timing of Weekly Plan Submission in F.Y.2015.

Table 2-6 Monthly Managed Congestion of Cross-regional Interconnection Lines by the timing of Weekly Plan Submission in F.Y.2015 [ h ]

| Interconnection | Weekly Plan Submission | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hokkaido-Honshu | Total | 0 | 2,236 | 0 | 7 | 3 | 146 | 165 | 5 | 27 | 7 | 25 | 1 | 2,620 |
| | Before Submission | 0 | 2,195 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,195 |
| | After Submission | 0 | 41 | 0 | 7 | 3 | 146 | 165 | 5 | 27 | 7 | 25 | 1 | 425 |
| Tohoku-Tokyo | Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Before Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | After Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tokyo-Chubu | Total | 243 | 311 | 29 | 11 | 44 | 85 | 477 | 99 | 0 | 5 | 2 | 218 | 1,523 |
| | Before Submission | 144 | 278 | 9 | 0 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 164 | 623 |
| | After Submission | 99 | 33 | 20 | 11 | 44 | 85 | 449 | 99 | 0 | 5 | 2 | 54 | 900 |
| Chubu-Kansai | Total | 720 | 745 | 720 | 744 | 744 | 720 | 744 | 720 | 744 | 744 | 696 | 744 | 8,785 |
| | Before Submission | 720 | 745 | 720 | 744 | 744 | 720 | 744 | 720 | 744 | 744 | 696 | 744 | 8,785 |
| | After Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chubu-Hokuriku | Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Before Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | After Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hokuriku-Kansai | Total | 2 | 566 | 68 | 0 | 0 | 46 | 10 | 0 | 0 | 0 | 0 | 0 | 692 |
| | Before Submission | 2 | 560 | 68 | 0 | 0 | 46 | 0 | 0 | 0 | 0 | 0 | 0 | 676 |
| | After Submission | 0 | 6 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 16 |
| Kansai-Chugoku | Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Before Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | After Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kansai-Shikoku | Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Before Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | After Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chugoku-Shikoku | Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Before Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | After Submission | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chugoku-Kyushu | Total | 210 | 0 | 476 | 0 | 0 | 0 | 0 | 30 | 175 | 19 | 0 | 312 | 1,221 |
| | Before Submission | 210 | 0 | 460 | 0 | 0 | 0 | 0 | 14 | 140 | 0 | 0 | 308 | 1,132 |
| | After Submission | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 16 | 35 | 19 | 0 | 4 | 89 |
| Nationwide | Total | 1,175 | 3,858 | 1,293 | 761 | 791 | 996 | 1,396 | 854 | 946 | 774 | 723 | 1,275 | 14,840 |
| | Before Submission | 1,076 | 3,778 | 1,257 | 744 | 744 | 766 | 772 | 734 | 884 | 744 | 696 | 1,216 | 13,410 |
| | After Submission | 99 | 80 | 36 | 17 | 47 | 231 | 624 | 120 | 62 | 30 | 27 | 59 | 1,430 |

* Total hours of allocation plans those managed to mitigate congestion.
* Managed hours are collected as 30 minutes and rounded up to an hour.

## (2) Annual Congestion Management of Cross-regional Interconnection Lines by Weekly Plan Submission in F.Y.20101～2015

Table 2-7 and Figure 2-9 show Annual Managed Congestion of Cross-regional Interconnection Lines by the timing of Weekly Plan Submission in F.Y.2010～2015.

Table 2-7 Annual Managed Congestion of Cross-regional Interconnection Lines by the timing of Weekly Plan Submission in F.Y.2010～2015 [h]

| | | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F.Y. 2015 | Total | 1,175 | 3,858 | 1,293 | 761 | 791 | 996 | 1,396 | 854 | 946 | 774 | 723 | 1,275 | 14,840 |
| | Before Submission | 1,076 | 3,778 | 1,257 | 744 | 744 | 766 | 772 | 734 | 884 | 744 | 696 | 1,216 | 13,410 |
| | After Submission | 99 | 80 | 36 | 17 | 47 | 231 | 624 | 120 | 62 | 30 | 27 | 59 | 1,430 |
| F.Y. 2014 | Total | 1,132 | 1,820 | 411 | 18 | 48 | 250 | 101 | 21 | 49 | 76 | 108 | 44 | 4,075 |
| | Before Submission | 898 | 1,701 | 256 | 0 | 12 | 82 | 30 | 0 | 0 | 0 | 0 | 0 | 2,978 |
| | After Submission | 234 | 120 | 155 | 18 | 36 | 168 | 71 | 21 | 49 | 76 | 108 | 44 | 1,097 |
| F.Y. 2013 | Total | 1,106 | 1,189 | 134 | 3 | 19 | 94 | 873 | 0 | 10 | 474 | 205 | 16 | 4,121 |
| | Before Submission | 736 | 476 | 100 | 0 | 0 | 32 | 814 | 0 | 5 | 196 | 0 | 0 | 2,359 |
| | After Submission | 370 | 713 | 34 | 3 | 19 | 62 | 59 | 0 | 5 | 278 | 205 | 16 | 1,762 |
| F.Y. 2012 | Total | 458 | 1,237 | 502 | 620 | 727 | 1,025 | 299 | 1,039 | 795 | 1 | 667 | 469 | 7,836 |
| | Before Submission | 234 | 1,032 | 0 | 0 | 0 | 447 | 198 | 808 | 698 | 0 | 667 | 420 | 4,503 |
| | After Submission | 224 | 205 | 502 | 620 | 727 | 578 | 101 | 231 | 97 | 1 | 0 | 49 | 3,333 |
| F.Y. 2011 | Total | 142 | 771 | 994 | 604 | 1,236 | 757 | 657 | 296 | 524 | 444 | 2,071 | 1,622 | 10,114 |
| | Before Submission | 84 | 541 | 144 | 224 | 1,178 | 384 | 302 | 1 | 0 | 0 | 1,543 | 1,488 | 5,889 |
| | After Submission | 58 | 230 | 850 | 380 | 58 | 373 | 355 | 295 | 524 | 444 | 528 | 134 | 4,226 |
| F.Y. 2010 | Total | 553 | 13 | 277 | 52 | 144 | 2 | 5 | 1 | 4 | 551 | 0 | 120 | 1,721 |
| | Before Submission | 420 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 504 | 0 | 0 | 924 |
| | After Submission | 133 | 13 | 277 | 52 | 144 | 2 | 5 | 1 | 4 | 48 | 0 | 120 | 798 |

* Values in red are annual maximum capabilities.
* Managed hours are collected as 30 minutes and rounded up to an hour.
* Total hours of utilization plans those managed to mitigate congestion.

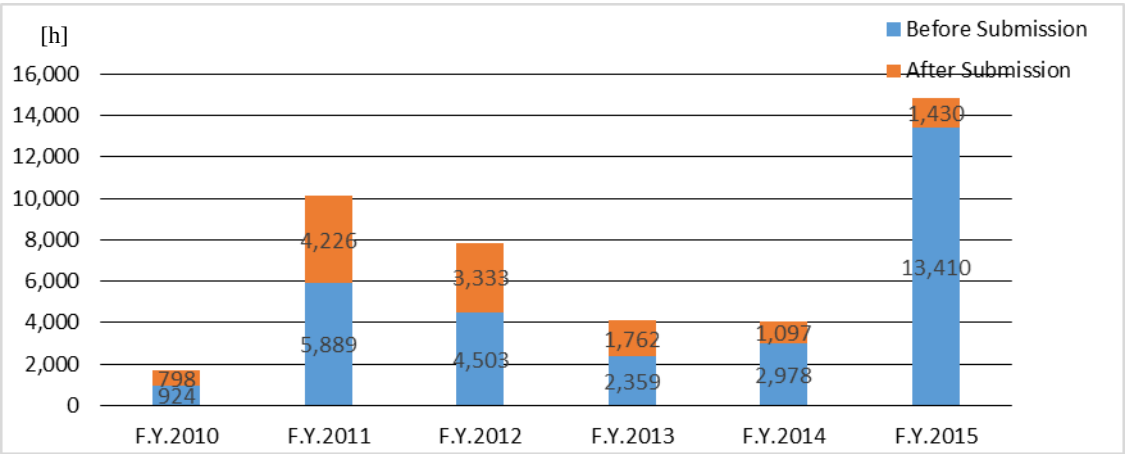



Figure 2-9 Annual Managed Congestion of Cross-regional Interconnection Lines by the timing of Weekly Plan Submission in F.Y.2010～2015

### (3) Monthly Congestion Management of Cross-regional Interconnection Lines by Constraints in F.Y.2015

Table 2-8 shows Monthly Managed Congestion of Cross-regional Interconnection Lines by Constraints in F.Y.2015

Table 2-8 shows Monthly Managed Congestion of Cross-regional Interconnection Lines by Constraints in F.Y.2015 [ h ]

| Interconnection | | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hokkaido-Honshu | Total | 0 | 2,236 | 0 | 7 | 3 | 146 | 165 | 5 | 27 | 7 | 25 | 1 | 2,620 |
| | Over Capability | 0 | 815 | 0 | 7 | 3 | 13 | 2 | 5 | 27 | 7 | 25 | 1 | 903 |
| | Minimum Flow | 0 | 1,421 | 0 | 0 | 0 | 133 | 163 | 0 | 0 | 0 | 0 | 0 | 1,717 |
| Tohoku-Tokyo | Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Over Capability | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Minimum Flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tokyo-Chubu | Total | 243 | 311 | 29 | 11 | 44 | 85 | 477 | 99 | 0 | 5 | 2 | 218 | 1,523 |
| | Over Capability | 243 | 311 | 29 | 11 | 44 | 85 | 477 | 99 | 0 | 5 | 2 | 218 | 1,523 |
| | Minimum Flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chubu-Kansai | Total | 720 | 745 | 720 | 744 | 744 | 720 | 744 | 720 | 744 | 744 | 696 | 744 | 8,785 |
| | Over Capability | 720 | 745 | 720 | 744 | 744 | 720 | 744 | 720 | 744 | 744 | 696 | 744 | 8,785 |
| | Minimum Flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chubu-Hokuriku | Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Over Capability | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Minimum Flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Hokuriku-Kansai | Total | 2 | 566 | 68 | 0 | 0 | 46 | 10 | 0 | 0 | 0 | 0 | 0 | 692 |
| | Over Capability | 2 | 566 | 68 | 0 | 0 | 46 | 10 | 0 | 0 | 0 | 0 | 0 | 692 |
| | Minimum Flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kansai-Chugoku | Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Over Capability | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Minimum Flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kansai-Shikoku | Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Over Capability | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Minimum Flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chugoku-Shikoku | Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Over Capability | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Minimum Flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Chugoku-Kyushu | Total | 210 | 0 | 476 | 0 | 0 | 0 | 0 | 30 | 175 | 19 | 0 | 312 | 1,221 |
| | Over Capability | 210 | 0 | 476 | 0 | 0 | 0 | 0 | 30 | 175 | 19 | 0 | 312 | 1,221 |
| | Minimum Flow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nationwide | Total | 1,175 | 3,858 | 1,293 | 761 | 791 | 996 | 1,396 | 854 | 946 | 774 | 723 | 1,275 | 14,840 |
| | Over Capability | 1,175 | 2,437 | 1,293 | 761 | 791 | 863 | 1,233 | 854 | 946 | 774 | 723 | 1,275 | 13,123 |
| | Minimum Flow | 0 | 1,421 | 0 | 0 | 0 | 133 | 163 | 0 | 0 | 0 | 0 | 0 | 1,717 |

* Total hours of utilization plans those managed to mitigate congestion.
* Managed hours are collected as 30 minutes and rounded up to an hour.

### (4) Annual Congestion Management of Cross-regional Interconnection Lines by Constraints in F.Y.2010～2015

Table 2-9 and Figure 2-10 show Annual Managed Congestion of Cross-regional Interconnection Lines by Constraints in F.Y.2010～2015.

Table 2-9 Annual Managed Congestion of Cross-regional Interconnection Lines by Constraints in F.Y.2010～2015 [h]

| | | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F.Y. 2015 | Total | 1,175 | 3,858 | 1,293 | 761 | 791 | 996 | 1,396 | 854 | 946 | 774 | 723 | 1,275 | 14,840 |
| | Over Capability | 1,175 | 2,437 | 1,293 | 761 | 791 | 863 | 1,233 | 854 | 946 | 774 | 723 | 1,275 | 13,123 |
| | Minimum Flow | 0 | 1,421 | 0 | 0 | 0 | 133 | 163 | 0 | 0 | 0 | 0 | 0 | 1,717 |
| F.Y. 2014 | Total | 1,132 | 1,820 | 411 | 18 | 48 | 250 | 101 | 21 | 49 | 76 | 108 | 44 | 4,075 |
| | Over Capability | 990 | 1,661 | 411 | 18 | 48 | 192 | 73 | 21 | 49 | 76 | 108 | 44 | 3,688 |
| | Minimum Flow | 142 | 160 | 0 | 0 | 0 | 58 | 28 | 0 | 0 | 0 | 0 | 0 | 387 |
| F.Y. 2013 | Total | 1,106 | 1,189 | 134 | 3 | 19 | 94 | 873 | 0 | 10 | 474 | 205 | 16 | 4,121 |
| | Over Capability | 928 | 853 | 134 | 3 | 19 | 94 | 324 | 0 | 10 | 474 | 205 | 16 | 3,058 |
| | Minimum Flow | 178 | 336 | 0 | 0 | 1 | 0 | 549 | 0 | 0 | 0 | 0 | 0 | 1,063 |
| F.Y. 2012 | Total | 458 | 1,237 | 502 | 620 | 727 | 1,025 | 299 | 1,039 | 795 | 1 | 667 | 469 | 7,836 |
| | Over Capability | 457 | 1,160 | 496 | 324 | 511 | 928 | 0 | 325 | 675 | 0 | 667 | 469 | 6,010 |
| | Minimum Flow | 1 | 77 | 6 | 296 | 217 | 97 | 299 | 715 | 120 | 1 | 0 | 0 | 1,826 |
| F.Y. 2011 | Total | 142 | 771 | 994 | 604 | 1,236 | 757 | 657 | 296 | 524 | 444 | 2,071 | 1,622 | 10,114 |
| | Over Capability | 114 | 613 | 144 | 9 | 10 | 143 | 124 | 36 | 496 | 434 | 2,069 | 1,621 | 5,810 |
| | Minimum Flow | 29 | 158 | 850 | 595 | 1,226 | 614 | 534 | 260 | 28 | 10 | 2 | 1 | 4,304 |
| F.Y. 2010 | Total | 553 | 13 | 277 | 52 | 144 | 2 | 5 | 1 | 4 | 551 | 0 | 120 | 1,721 |
| | Over Capability | 500 | 4 | 2 | 49 | 0 | 2 | 5 | 1 | 2 | 19 | 0 | 97 | 680 |
| | Minimum Flow | 53 | 9 | 276 | 3 | 144 | 0 | 0 | 0 | 2 | 532 | 0 | 24 | 1,042 |

* Values in red are annual maximum capabilities.
* Managed hours are collected as 30 minutes and rounded up to an hour.
* Total hours of utilization plans those managed to mitigate congestion.

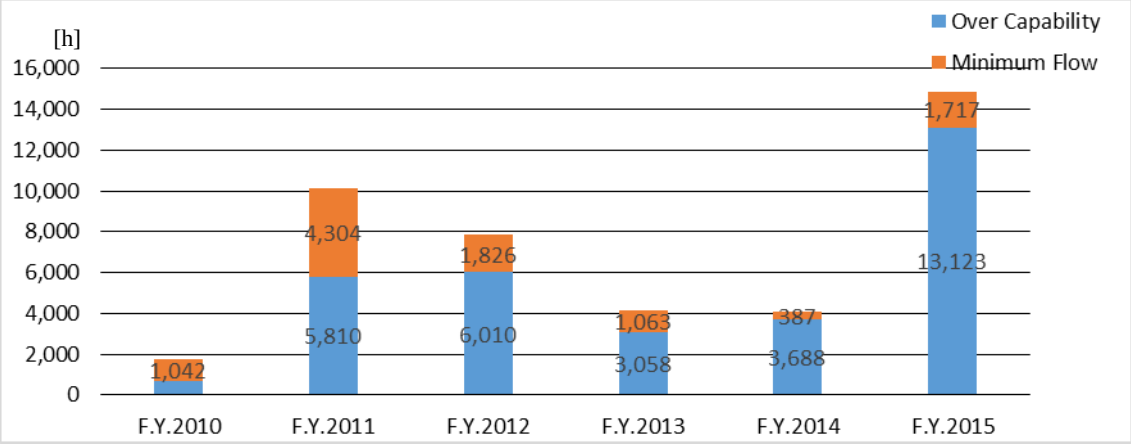



Figure 2-10 show Annual Managed Congestion of Cross-regional Interconnection Lines by Constraints in F.Y.2010～2015

## 4. State of Maintenance Work of Cross-regional Interconnection Lines in F.Y.2015

Followings are actual Maintenance Work of Cross-regional Interconnection Lines reported by General Transmission and Distribution Companies according to the provision of the Article 167 of the Operational Rules.

### (1)Actual Monthly Maintenance Work of Cross-regional Interconnection Lines in F.Y.2015

Table 2-10 shows Monthly Maintenance Work of Cross-regional Interconnection Lines in F.Y.2015, and Figure 2-11 shows Monthly Planned Outage Rate of Nationwide in F.Y.2015.

Table 2-10 shows Monthly Maintenance Work of Cross-regional Interconnection Lines in F.Y.2015

| Interconnection | Corresponding Facilities | Apr. | | May | | Jun. | | Jul. | | Aug. | | Sep. | | Oct. | | Nov. | | Dec. | | Jan. | | Feb. | | Mar. | | Annual | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No. | Days | No. | Days | No. | Days | No. | Days | No. | Days | No. | Days | No. | Days | No. | Days | No. | Days | No. | Days | No. | Days | No. | Days | No. | Days |
| Hokkaido-Honshu | Hokkaido and Honshu AC/DC C.S. | | | 4 | 16 | | | | | | | 3 | 4 | 8 | 16 | | | | | | | | | | | 15 | 36 |
| Tohoku-Tokyo | Soma-Futaba bulk line | | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 |
| Tokyo-Chubu | Sakuma FC C.S. | | | 1 | 1 | 1 | 2 | | | | | 1 | 2 | 2 | 4 | 1 | 5 | | | | | | | | | 6 | 14 |
| | Shin Shinano FC C.S. | 1 | 2 | 1 | 7 | 1 | 8 | | | | | 2 | 3 | 4 | 12 | 1 | 1 | | | | | | | | | 10 | 33 |
| | Higashi Shimizu FC C.S. | 1 | 12 | | | 1 | 1 | | | | | | | 1 | 7 | | | | | | | | | 1 | 12 | 4 | 32 |
| Chubu-Kansai | Mie-Higashi Omi line | | | 2 | 1 | | | | | | | | | | | | | | | | | | | | | 2 | 1 |
| Chubu-Hokuriku | Minami Fukumitsu HVDC BTB C.S.and Minami Fukumitsu Substation | | | | | | | | | | | 1 | 18 | | | | | | | | | | | | | 1 | 18 |
| Hokuriku-Kansai | Echizen-Reinan line | 1 | 2 | 6 | 30 | 4 | 10 | | | | | | | 2 | 2 | 1 | 2 | | | | | | | | | 14 | 46 |
| Kansai-Chugoku | Seiban-Higashi Okayama line, Yamazaki-Chizu line | | | | | | | | | | | | | 3 | 5 | 1 | 2 | 1 | 1 | | | | | 1 | 1 | 6 | 9 |
| Kansai-Shikoku | Kihoku and Anan AC/DC C.S. | 2 | 14 | 5 | 5 | 1 | 7 | | | | | | | | | | | | | | | | | 1 | 3 | 9 | 29 |
| Chugoku-Shikoku | Honshi interconnection line | 3 | 20 | 1 | 1 | | | | | | | | | | | | | | | | | | | 1 | 13 | 5 | 34 |
| Chugoku-Kyushu | Kanmon interconnection line | 4 | 12 | 5 | 31 | 6 | 7 | | | | | | | 2 | 2 | | | | | | | | | 2 | 13 | 19 | 65 |
| Nationwide (Cumulative works for the same facilities deducted) | | 12 | 62 | 25 | 92 | 14 | 35 | 0 | 0 | 0 | 0 | 7 | 27 | 22 | 48 | 4 | 10 | 1 | 1 | 0 | 0 | 0 | 0 | 6 | 42 | 91 | 317 |

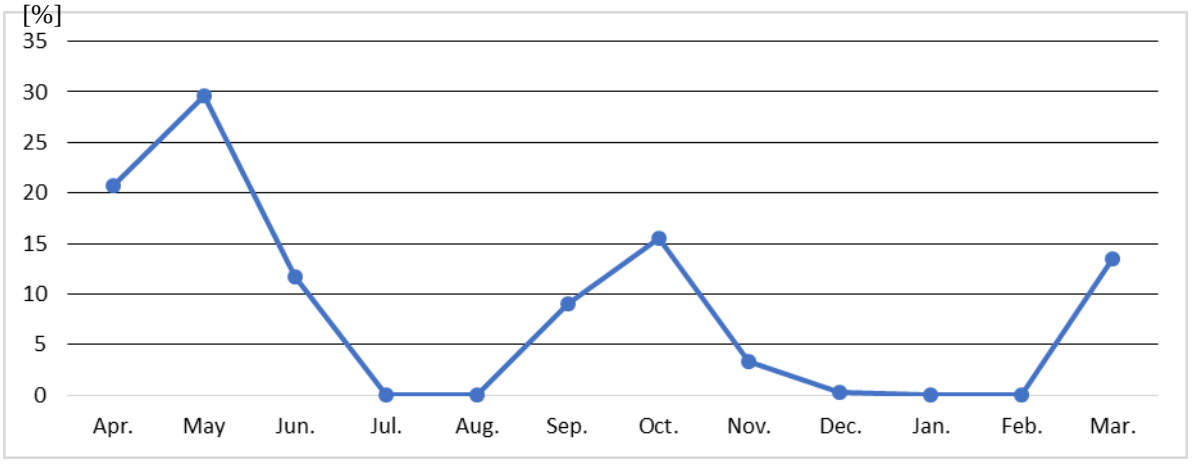



Figure 2-11 Monthly Planned Outage Rate of Nationwide in F.Y.2015

$$\text{* Monthly Planned Outage Rate(\%)} = \frac{\text{Total days of Planned Outage in the month}}{\text{10 interconnection lines} \times \text{calendar days}}$$

### (2) Annual Maintenance Work of Cross-regional Interconnection Lines in F.Y.2010～2015

Table 2-11 shows Annual Maintenance Work of Cross-regional Interconnection Lines in F.Y.2010～2015.

Table 2-11 Annual Maintenance Work of Cross-regional Interconnection Lines in F.Y.2010～2015

| | F.Y.2010 | F.Y.2011 | F.Y.2012 | F.Y.2013 | F.Y.2014 | F.Y.2015 | Total | Average |
|---|---|---|---|---|---|---|---|---|
| Nos. | 64 | 56 | 58 | 38 | 63 | 91 | 370 | 62 |

## 5. Unplanned Outage of Cross-regional Interconnection Lines in F.Y.2015

### (1) Unplanned Outage of Cross-regional Interconnection Lines in F.Y.2015

Table 2-12 shows Unplanned Outage of Cross-regional Interconnection Lines in F.Y.2015.

Table 2-12 Unplanned Outage of Cross-regional Interconnection Lines in F.Y.2015

| Date | Facilities | Causes |
|---|---|---|
| Oct. 6 | Shin Shinano FC unit No.2 | Emergency shutdown by malfunction of Harmonics Filter |
| Oct. 18 | Sakuma FC | Emergency shutdown by malfunction of Master-control Board of 60Hz Control Panel |
| Oct. 28 | Shin Shinano FC unit No.2 | Emergency shutdown by malfunction of 50Hz Convert Trans Relay |

* Unplanned Outage which has affected Total Transfer Capability is described.

### (2) Annual Unplanned Outage of Cross-regional Interconnection Lines in F.Y.2010～2015

Table 2-13 shows Annual Unplanned Outage of Cross-regional Interconnection Lines in F.Y.2010～2015.

Table 2-13 Annual Unplanned Outage of Cross-regional Interconnection Lines in F.Y.2010～2015

| | F.Y.2010 | F.Y.2011 | F.Y.2012 | F.Y.2013 | F.Y.2014 | F.Y.2015 | Total | Average |
|---|---|---|---|---|---|---|---|---|
| Nos. | 9 | 5 | 6 | 9 | 1 | 3 | 33 | 6 |

## 6. Actual Utilization* of Transmission Margin

There was no actual utilization of Transmission Margin according to the provision of Article151 of the Operational Rules.

* "Utilization of Transmission Margin" means that General Transmission and Distribution Companies supply electricity by utilizing part of Transmission Margin, in case of no ATC on the interconnection lines which applicants for capability allocation of interconnection lines wish to use.

## 7. Actual Employment* of Transmission Margin

Table 2-14 shows actual employment of Transmission Margin in F.Y.2015 according to the provision of Article 152 of the Operational Rules.

Table 2-14 Actual Employment of Transmission Margin in F.Y.2015

| Date | Period | Capability | Interconnection | Reason |
|---|---|---|---|---|
| April 8 | 18:00～18:30 | 597MW | Tokyo-Chubu Interconnection Facilities (Chubu→Tokyo) | Insufficient Available Transfer Capability of corresponding interconnection facilities according to electricity supply instructed by the Organization for improvement of demand-supply state. |
| | 18:30～19:00 | 505MW | | |
| | 19:00～19:30 | 417MW | | |
| | 19:30～20:00 | 339MW | | |
| | 20:00～20:30 | 449MW | | |
| | 20:30～21:00 | 553MW | | |

* "Employment of Transmission Margin" means that General Transmission and Distribution Companies supply electricity by employing Transmission Margin allocated to Interconnection Lines, in case where the supply-demand balance is tight or insufficient to reduce power supply or there are such possibilities.

## 8. Actual Available Transfer Capability of each Cross-regional Interconnection Line

Actual Available Transfer Capability calculated and published according to Article 133 of Operational Rules are shown on following pages.

- How to see graphs of actual ATC

  Interconnection Lines shall be utilized according to the procedures described in 1(2) of Chapter II.

  [①Calculation of TTC]→[②Calculation of Margin]→[③Registration of SPF]→[④Calculation of ATC]

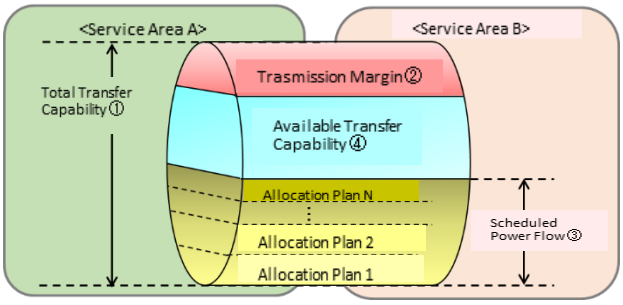



Figure 2-12 Concept on Utilization of Cross-regional Interconnection Lines

Graphs of actual ATC of each interconnection lines in F.Y.2015 are on the following pages, based on the above concept. How to see the graphs is described as below according to the procedures ①～④.

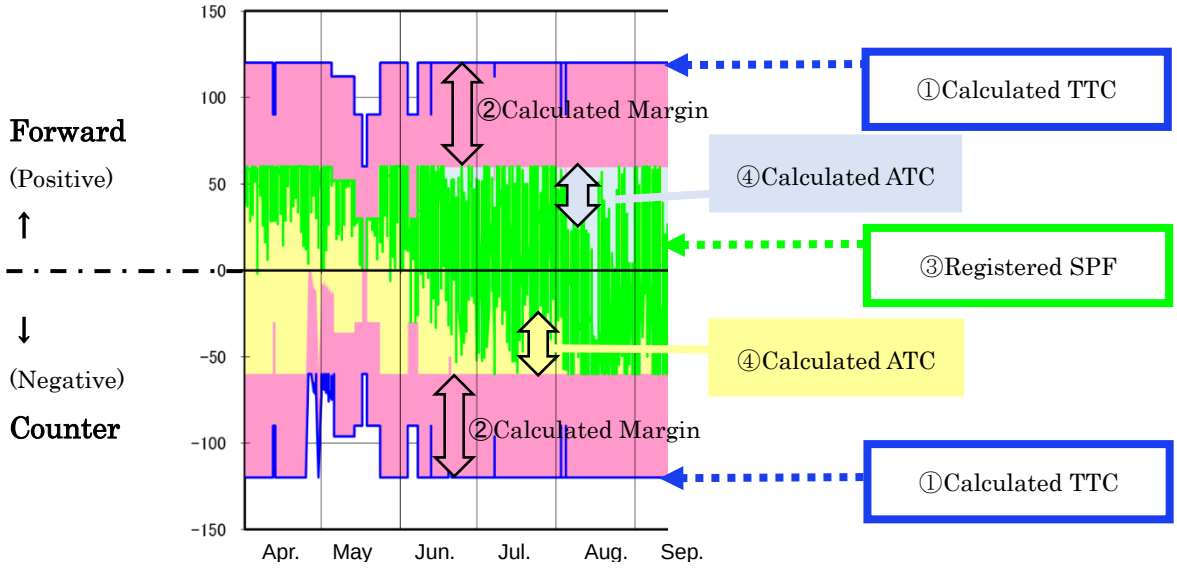



Figure 2-13 How to see graphs of actual Available Transfer Capability

*Scheduled Power Flow

Actual flows on the transmission lines are the offsets of each direction. Thus, Scheduled Power Flow is the offset figure between "Forward Flow" and "Counter Flow", not the simple addition of each direction. Also on the graphs, offset figures are spotted on as SPF, not spotting each capacity of "Forward Flow" and "Counter Flow" respectively.

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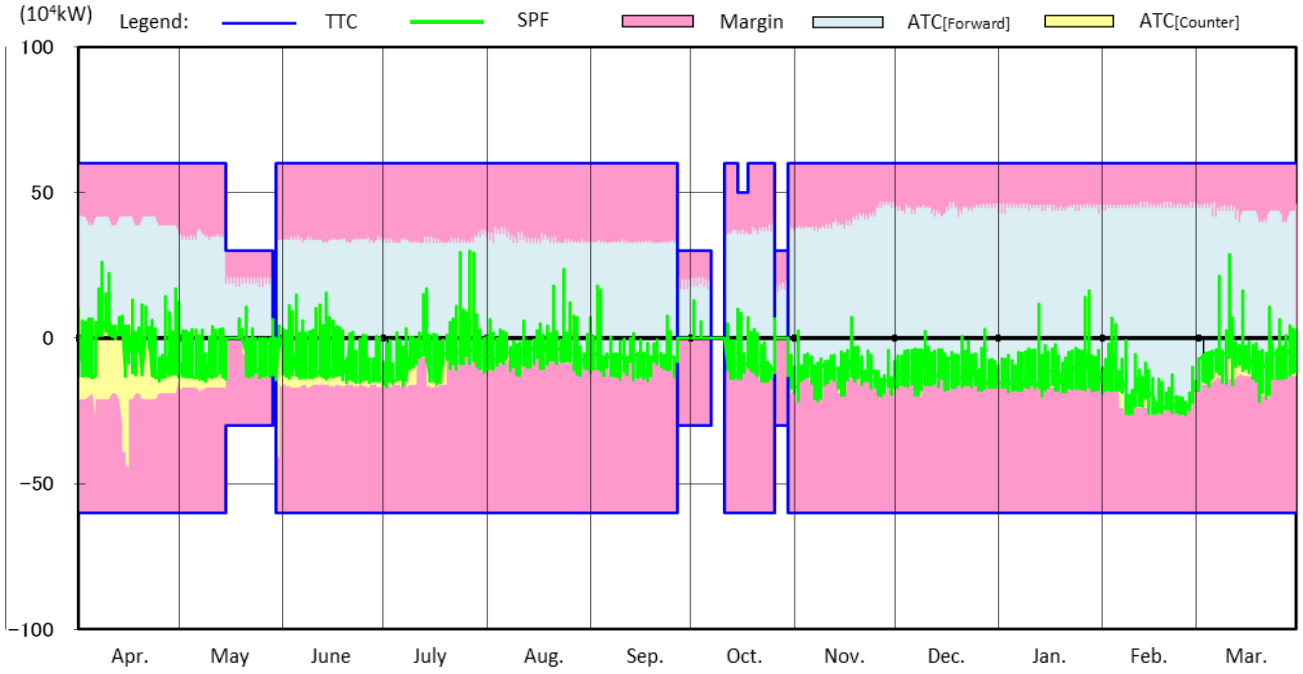
【Reference】Publishing actual ATC

Detailed Network System Information including actual ATC is available at the url below.

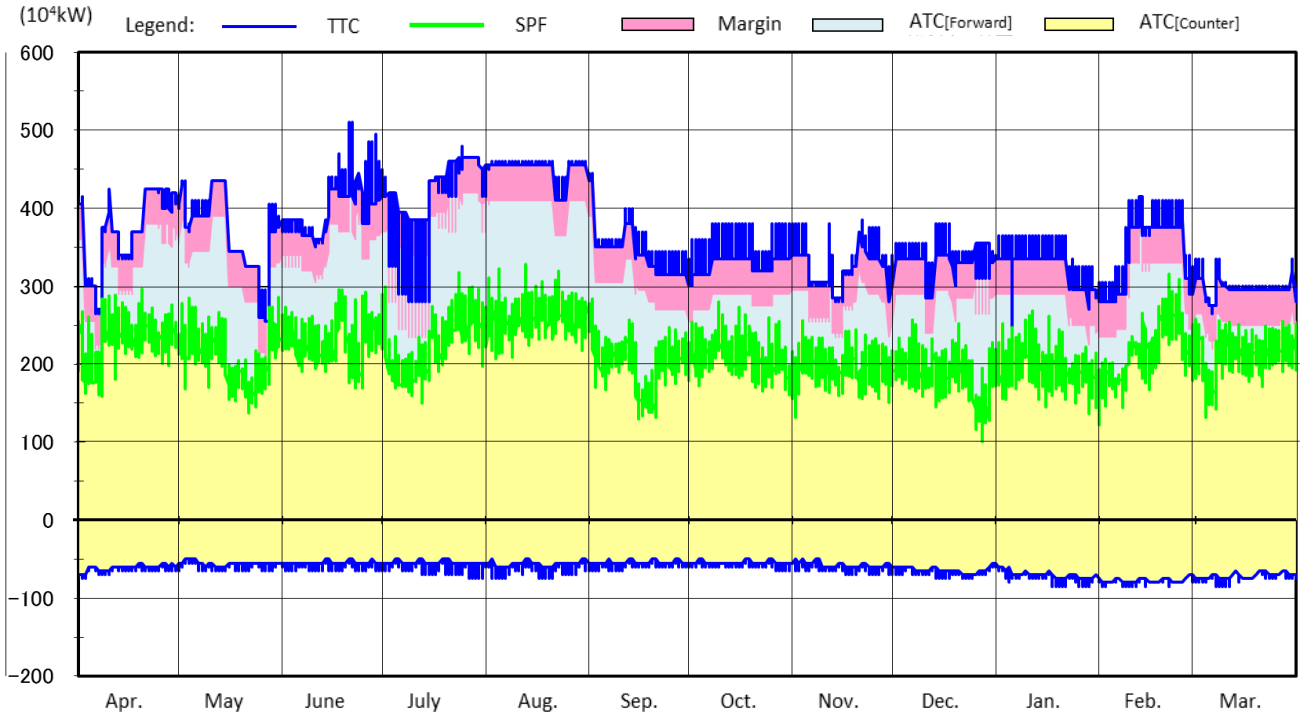
URL : http://occtonet.occto.or.jp/public/dfw/RP11/OCCTO/SD/LOGIN_login#

Figure 2-14 **Interconnection facilities between Hokkaido and Honshu** [Hokkaido and Honshu AC/DC C.S.]



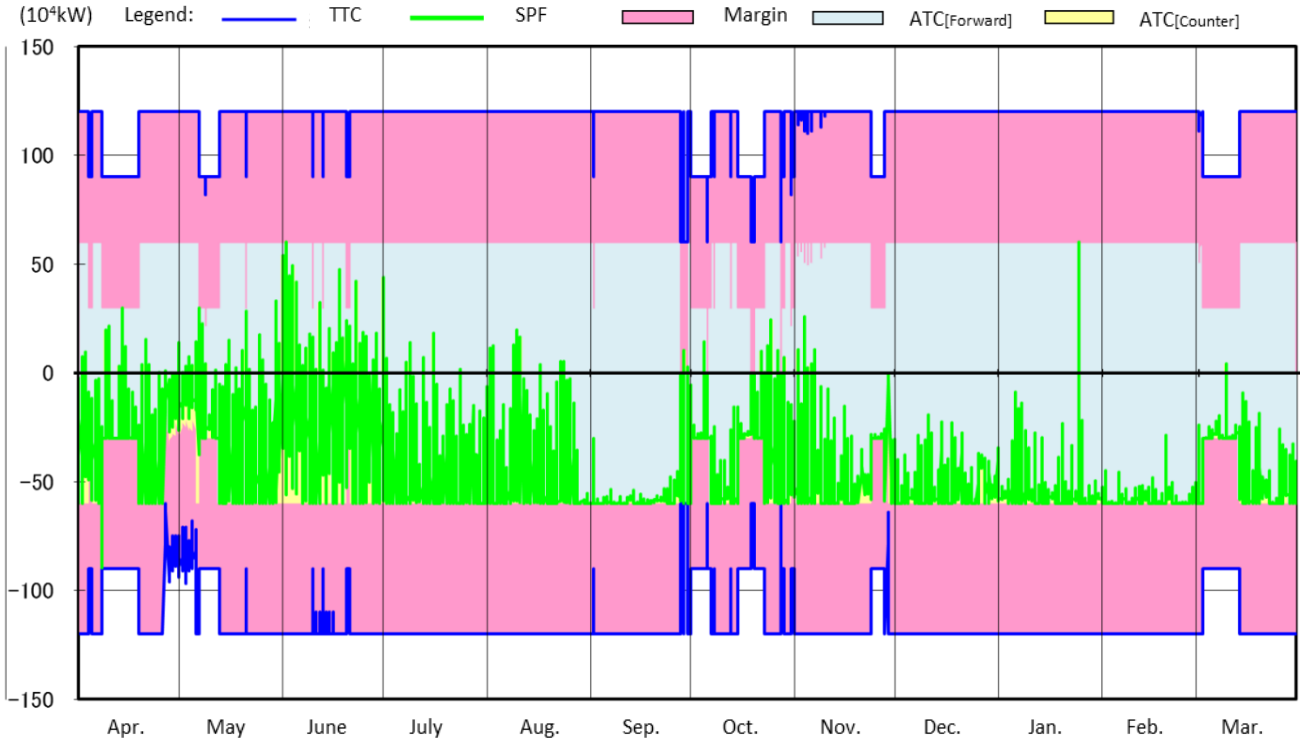

Note: Hokkaido→Tohoku as Forward(positive), Tohoku→Hokkaido as Counter(negative).

Figure 2-15 **Interconnection line between Tohoku and Tokyo** [Soma-Futaba bulk line]



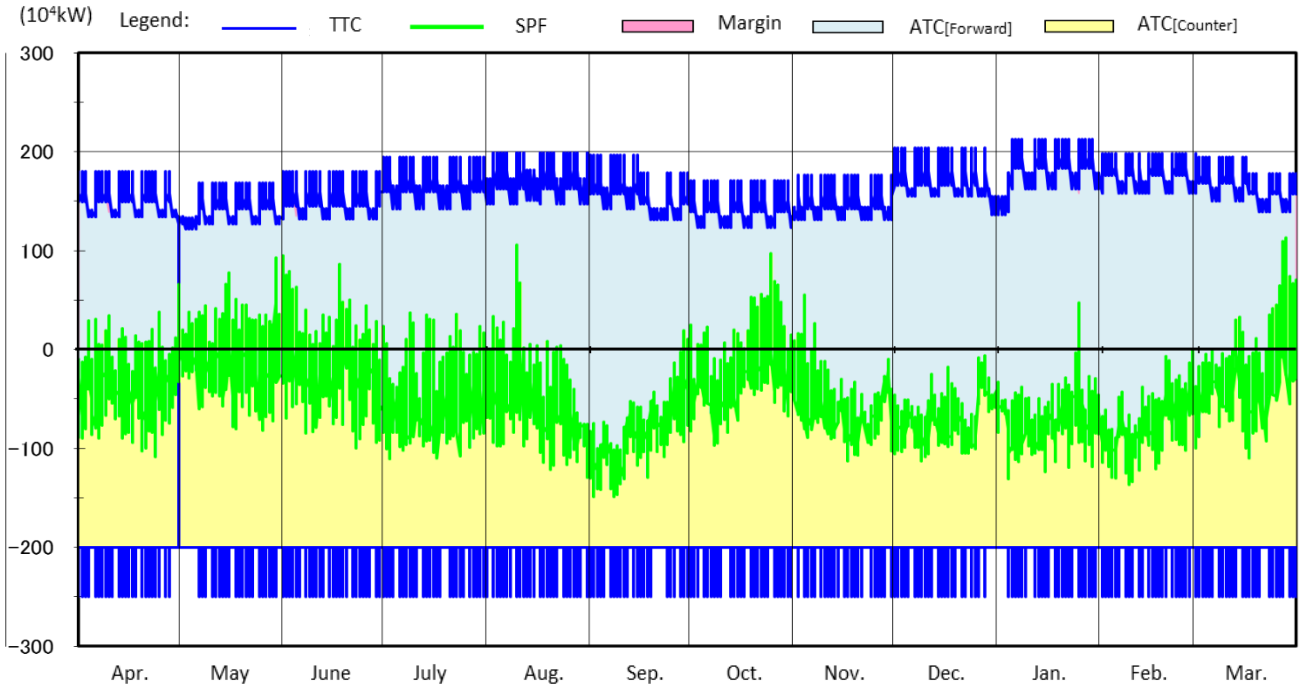

Note: Tohoku→Tokyo as Forward(positive), Tokyo→Tohoku as Counter(negative).

Figure 2-16 **Interconnection facilities between Tokyo and Chubu** [Sakuma, Shin-Shinano & Higashi Shimizu FC]




Note: Tokyo→Chubu as Forward(positive), Tokyo→Chubu as Counter(negative)

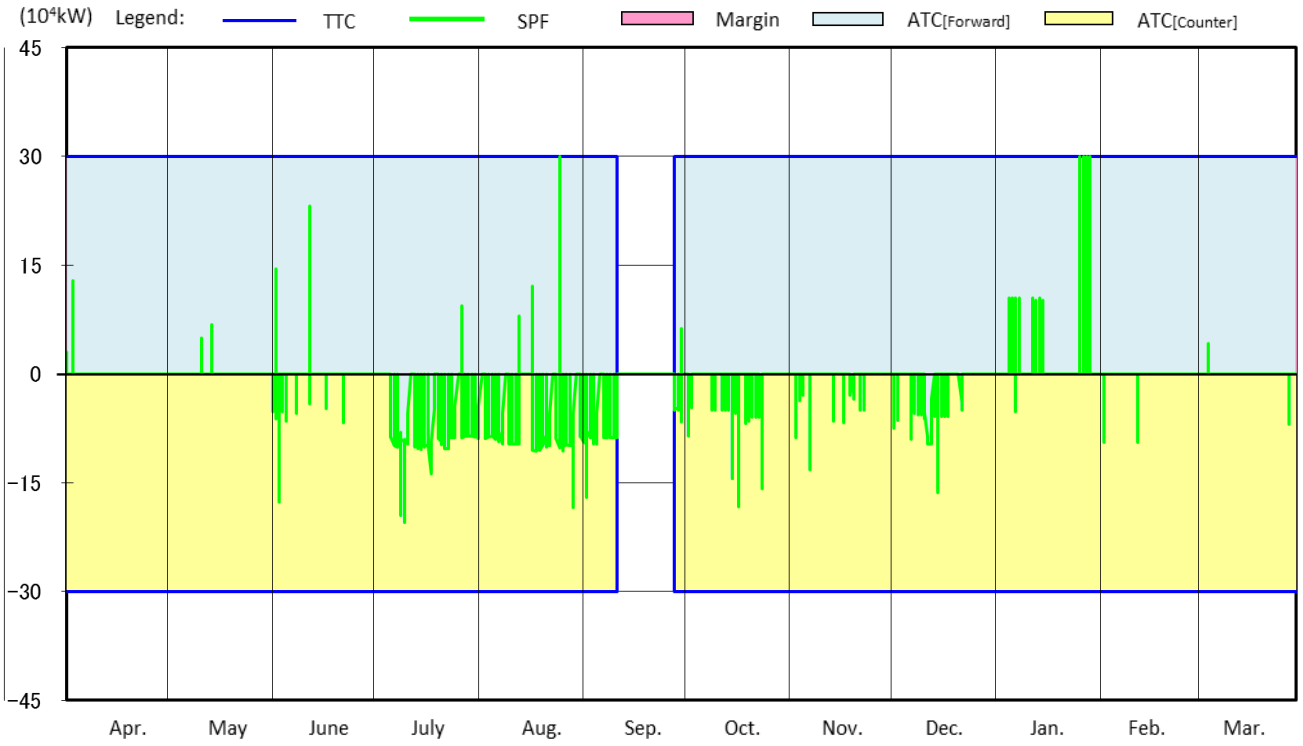
Figure 2-17 **Interconnection line between Chubu and Kansai** [Mie-Higashi Omi line]




Note: Chubu→Kansai as Forward(positive), Kansai→Chubu as Counter(negative)

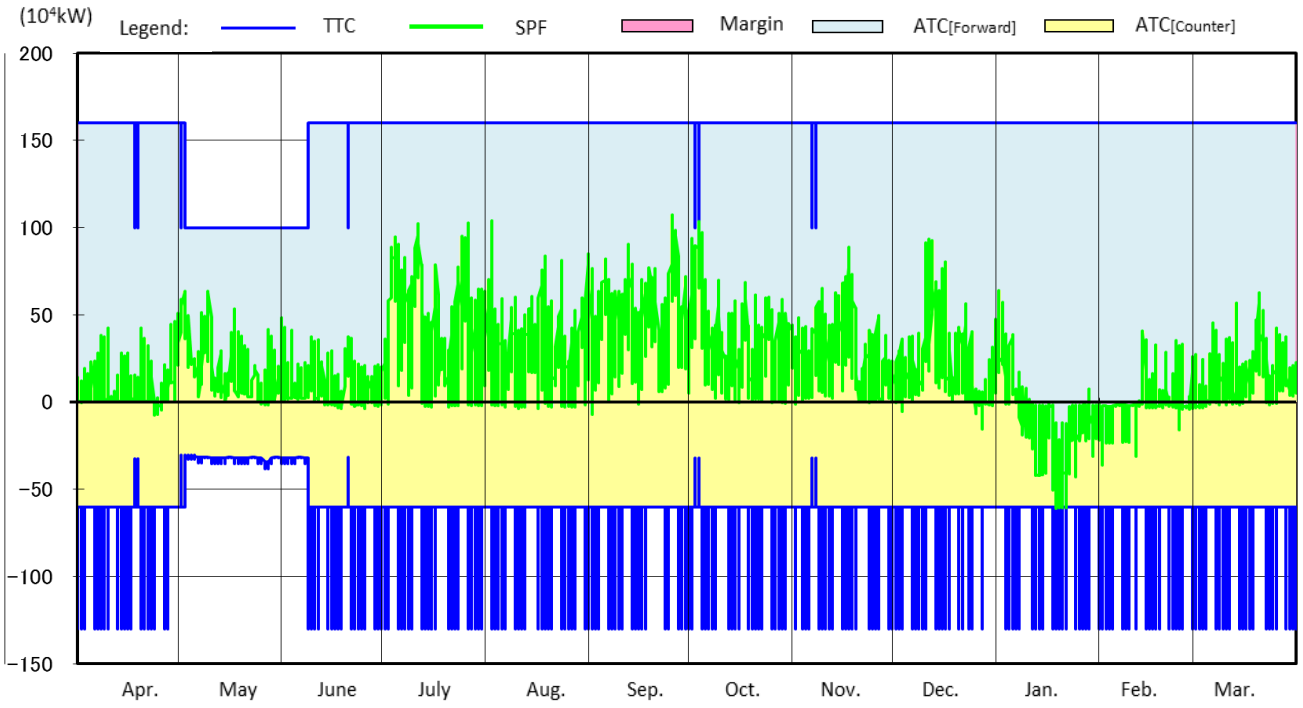
Figure 2-18 **Interconnection facilities between Chubu and Hokuriku**

[Minami Fukumitsu HVDC BTB C.S. and Minami Fukumitsu Substation]




Note: Chubu→Hokuriku as Forward(positive), Hokuriku→Chubu as Counter(negative)

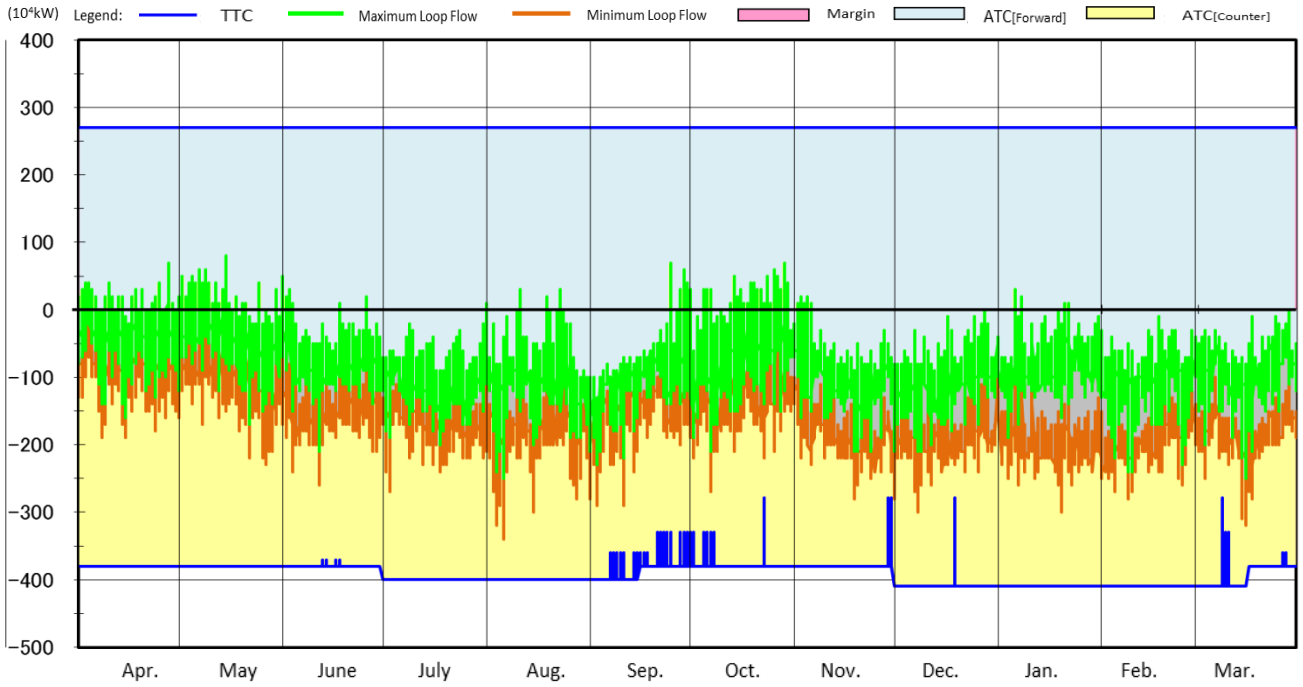
Figure 2-19 **Interconnection line between Hokuriku and Kansai** [Echizen-Reinan line]




Note: Hokuriku→Kansai as Forward(positive), Kansai→Hokuriku as Counter(negative)

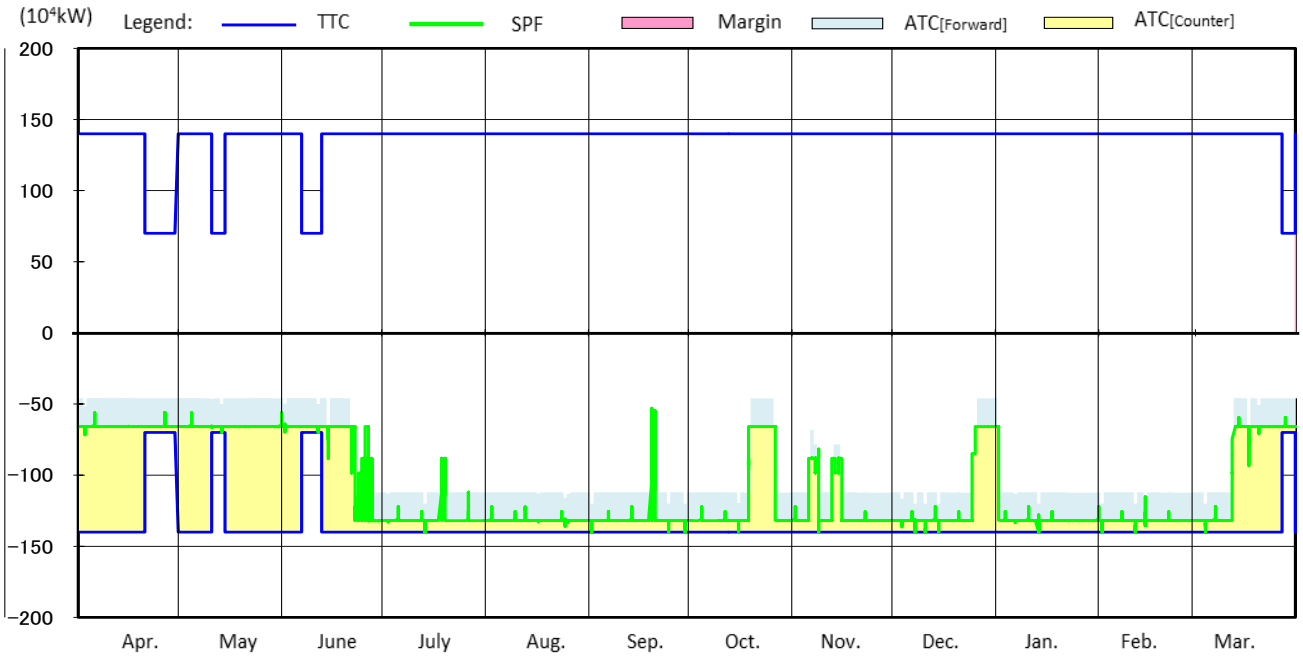
Figure 2-20 **Interconnection lines between Kansai and Chugoku**

[Seiban-Higashi Okayama line, Yamazaki-Chizu line]




Note: Kansai→Chugoku as Forward(positive), Chugoku→Kansai as Counter(negative)

Figure 2-21 **Interconnection facilities between Kansai and Shikoku** [Kihoku and Anan AC/DC C.S.]



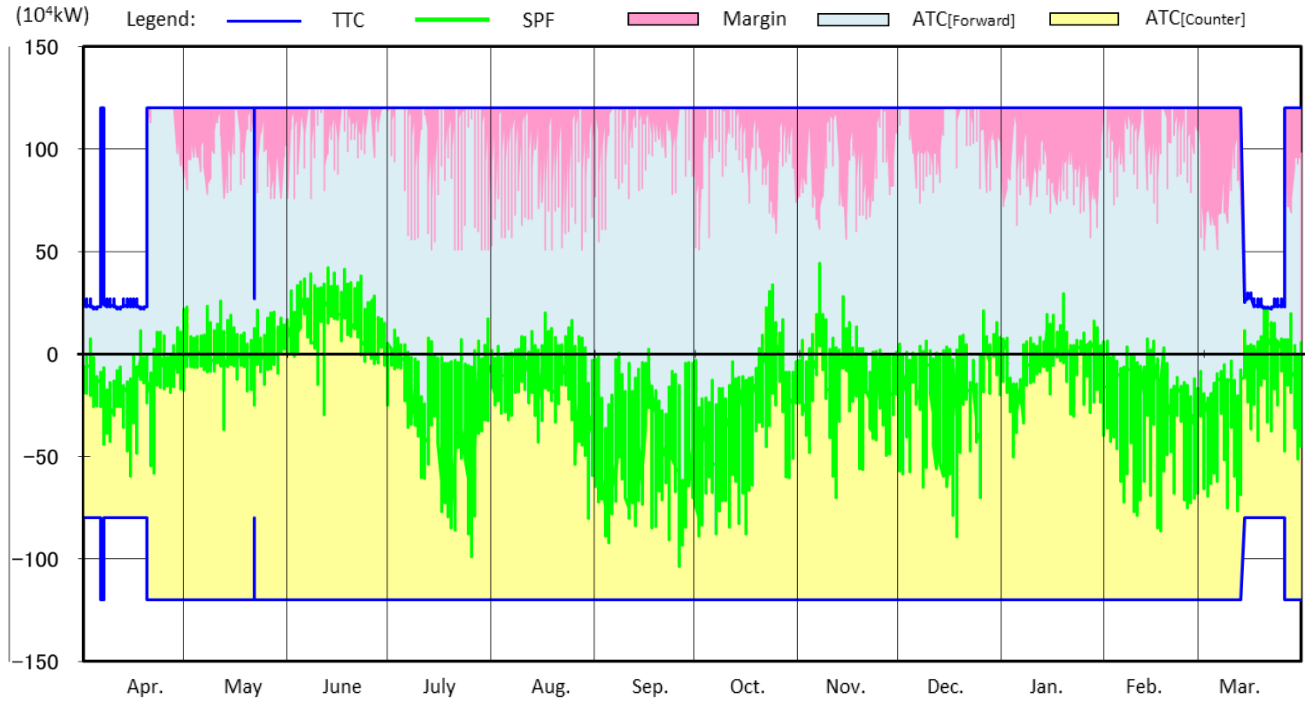

Note: Kansai→Shikoku as Forward(positive), Shikoku→Kansai as Counter(negative)

※ATC on Forward is calculated and chosen of either smaller.

・TTC－Transfer Margin－SPF

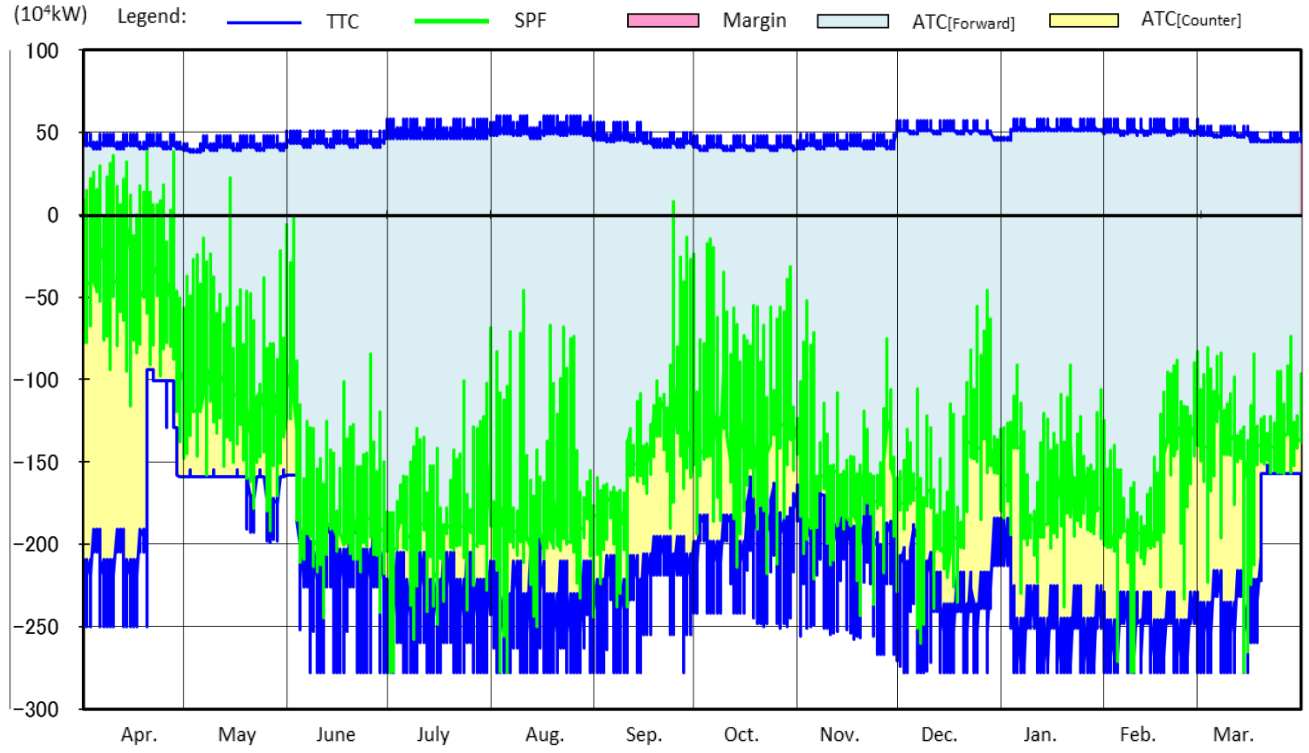
・TTC of Minami Awa bulk line－(Supply Capacity of Tachibanawan Thermal Power Station－SPF of Anan-Kihoku DC bulk line)

Figure 2-22 **Interconnection line between Chugoku and Shikoku** [Honshi interconnection line]




Note: Chugoku→Shikoku as Forward(positive), Shikoku→Chugoku as Counter(negative)

Figure 2-23 **Interconnection line between Chugoku and Kyushu** [Kanmon interconnection line]




Note: Chugoku→Kyushu as Forward(positive), Kyushu→Chugoku as Counter(negative)

Organization for Coordination of
Cross-regional Transmission
Operators, JAPAN
General Planning Dept.
+813-6632-0902
http://www.occto.or.jp