Outlook of Electricity Supply–Demand and Cross-regional Interconnection Lines:

Actual Data for Fiscal Year 2017

December 2018

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

FOREWORD

The Organization for Cross-regional Coordination of Transmission Operators, JAPAN (hereinafter, the Organization), prepares and publishes its Annual Report according to Article 181 of the Operational Rules regarding the matters specified below.

i. Actual electric supply and demand (including evaluation and analysis of quality of electricity in light of frequency, voltage, and blackouts of each regional service area)
ii. State of electric network
iii. Actual Network Access Business until the previous year.
iv. Forecast on electric demand and electric network (including forecast of improvement of restriction on network interconnection of generation facilities) for the next fiscal year and a mid- and long-term period based on a result of compiling of electricity supply plans and their issues.
v. Evaluation and verification of proper standards of reserve margin and balancing capacities of each regional service area based on the next article, as well as contents of review as needed

The Organization published the actual data for electricity supply–demand and network system utilization ahead of the Annual Report because of the completion of actual data collection up to FY 2017.

SUMMARY

This report is presented to review the outlook of electricity supply–demand and cross-regional interconnection lines in fiscal year 2017 (FY 2017), based on the Article 181 of the Operational Rules of the Organization.

The report consists of two parts: one is the situation of electricity supply and demand, and the other is interconnection lines.

Regarding supply and demand, the peak demand, 155,770 MW, and the monthly electric energy requirement, 87,438 GWh, nationwide, were recorded in January due to severe winter weather conditions across all of Japan.

The reserve margin against summer and winter peak demand was 13.9% and 8.6%, respectively.

Power exchange instructions by the Organization reached 10 times, and all instructions were dispatched either in January or February.

The number of the requests to shed power generation by renewables was 78 in FY 2017, and they happened in isolated islands of the Kyusyu area.

The total volume of the utilization of interconnection lines was 132,395 GWh, and +29,345 GWh over FY 2016.

The total number of congestion management hour was 45,358 h, and + 40,190 h over FY 2016.

The numbers and days of the maintenance of interconnection lines were 267 times and 432 days in total over FY 2017.

We hope the report helps you.

CONTENTS

Note:
The text of the Operational Rules was obtained from the amended version of April 1, 2018. Data for Chapter I include figures at the sending end, i.e., the electricity supplied to the public network system from power plants with energy deducted for station services.

CHAPTER I: ACTUAL ELECTRICITY SUPPLY AND DEMAND

1. Regional Service Areas for 10 General Transmission and Distribution Companies, and the Definition of a Season

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

A regional service area describes the specific area to which a general transmission and distribution (GT&D) company transmits its electricity through cross-regional interconnection lines. Japan is divided into 10 regional service areas as shown in Figure 1-1. Regional service areas served by GT&D companies other than the Okinawa Electric Power Company (EPCO) are connected by the cross-regional interconnection lines.

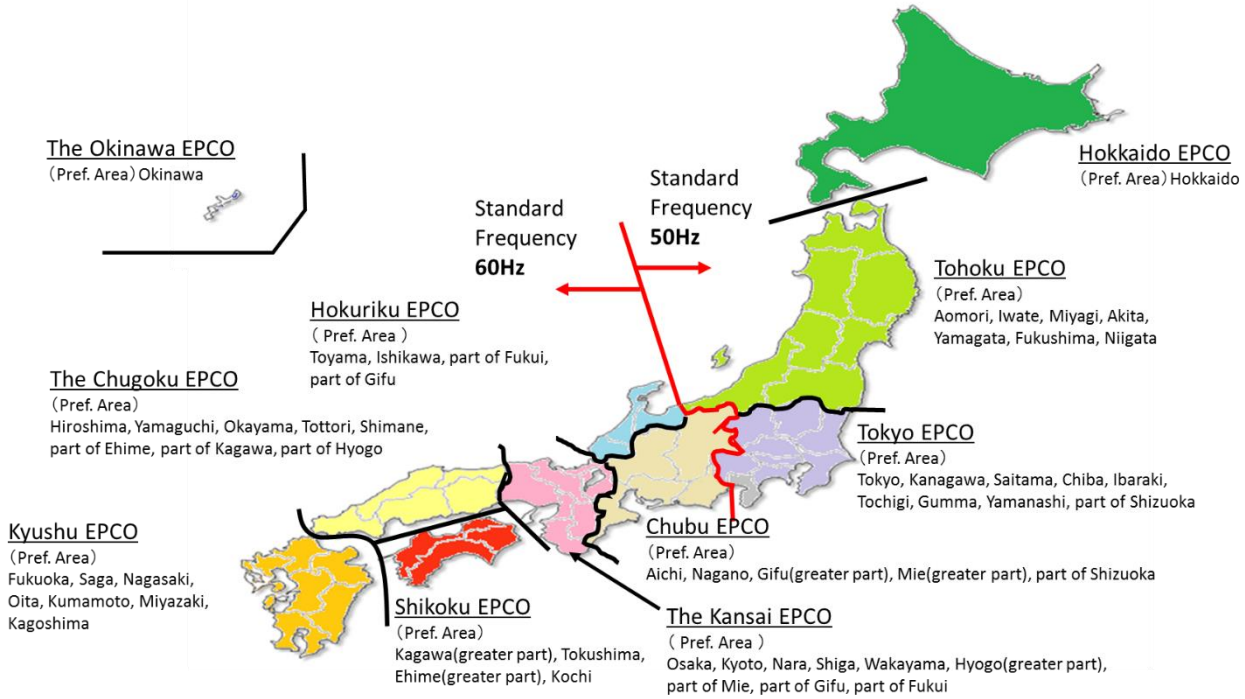


Figure 1-1: The 10 Regional Service Areas in Japan and their Prefectural Distribution

(2) The Definition of Seasons

The report divides the seasons into summer and winter periods. The summer period is defined as July, August, and September. The winter period is defined as December, the following January, and February.

2. Outlook of Actual Weather Nationwide

(1) Weather during the Summer Period (June to August)

Table 1-1 shows anomalies in the temperature and precipitation ratios from June to August in FY 2017.

(a) Seasonal mean temperature was + 0.6 ˚C in the eastern region and + 0.7 ˚C in the western region over climatological normal due to more frequent flows of warm air from the west because of greater expansion of Pacific high-pressure system to the west. In the Okinawa/Amami region, the summer mean temperature was + 0.7˚C above climatological normal due to more sunshine days attributable to Pacific high-pressure system.

(b) Rainfall during the period was significant in Japan Sea's coast along the eastern region, and plenty in Japan Sea's coast along the northern region due to larger influence of low-pressure systems and stationary front. However, across the Pacific Sea's coast along the eastern region and Japan Sea's coast along the western region were insignificant amounts of rainfall due to less influence from seasonal rains.

Table 1-1: Anomalies in Temperature and Rainfall by Weather Region from June to August (FY 2017)

Weather Region	Mean Temperature Anomaly[°C]	Precipitation Ratio[%]
Northern	+0.3	+13
Eastern	+0.6	-7
Western	+0.7	-16
Okinawa/Amami	+0.7	-26

Source: Japan Meteorological Agency, Tokyo Climate Center.
Seasonal Climate Report over Japan for Summer (FY 2017).
http://ds.data.jma.go.jp/tcc/tcc/products/japan/climate/index.php?kikan=3mon&month=8&year=2017
http://www.data.jma.go.jp/gmd/cpd/cgi-bin/view/kikohyo/en.php?kikan=3mon&month=8&year=2017

(2) Weather during the Winter Period (December to the following February)

Table 1-2 shows the anomalies in temperature and the ratios of rainfall and snowfall from December to the following February in FY 2017.

(a) Seasonal mean temperatures were below climatological normal throughout the nation due to frequent flows of intensive cold air around Japan. In particular, the western region had an extremely cold winter after an interval of 32 years.

(b) Snowfall during the period was significant in Japan Sea's coast along the western region, and plenty in Japan Sea's coast along the eastern region due to frequent strong winter pressure patterns. In addition, some parts of Japan Sea's coast along the northern and western regions have record breaking snowfalls due to active flows of developed snow clouds from the Japan Sea. Also, the Pacific Sea coast of the northern and eastern region had days of much snow due to low pressure patterns.

(c) Sunshine durations during the period were significantly above normal on the Pacific Sea's coast along the eastern region and well above normal on the Pacific Sea's coast along the western region due to dominant winter pressure patterns.

Table 1-2: Anomalies in Temperature, Rainfall, and Snowfall by Weather Region from December to February (FY 2017)

Weather Region	Mean Temperature Anomaly[℃]	Precipitation Ratio[%]	Snowfall Ratio[%]
Northern	-0.4	+5	-7
Eastern	-0.7	-27	+5
Western	-1.2	-17	+21
Okinawa/Amami	-0.3	-18	-

Source：Japan Meteorological Agency, Tokyo Climate Center.
Seasonal Climate Report over Japan for Winter (FY 2017).
http://ds.data.jma.go.jp/tcc/tcc/products/japan/climate/index.php?kikan=3mon&month=2&year=2018
http://www.data.jma.go.jp/gmd/cpd/cgi-bin/view/kikohyo/en.php?kikan=3mon&month=2&year=2018

3. Actual Nationwide Peak Demand

Peak demand describes the highest consumption of electricity during a given period, such as day, month, or year. Table 1-3 shows the monthly peak demand for regional service areas in FY 2017. Figures 1-2 and 1-3 show the nationwide monthly peak demand*, and the annual peak demand by regional service areas, respectively. In this report, "peak demand" refers to the maximum hourly value of electric energy requirement.

Table 1-3: Monthly Peak Demand for Regional Service Areas (FY 2017)

[10^4kW]

	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Hokkaido	406	358	354	433	401	388	423	467	512	525	498	503
Tohoku	1,056	1,011	1,059	1,302	1,284	1,068	1,069	1,231	1,373	1,461	1,380	1,278
Tokyo	4,090	3,883	4,102	5,047	5,383	4,385	4,058	4,263	4,566	5,124	5,266	4,521
Chubu	1,882	1,899	1,966	2,343	2,473	2,086	1,973	2,001	2,216	2,378	2,339	2,034
Hokuriku	386	392	409	502	497	421	396	442	499	541	517	452
Kansai	1,867	1,948	2,042	2,619	2,638	2,204	2,040	2,114	2,360	2,560	2,517	2,133
Chugoku	771	784	819	1,034	1,072	866	811	892	1,025	1,096	1,076	888
Shikoku	359	362	387	520	520	416	393	407	468	508	506	406
Kyushu	1,042	1,072	1,279	1,562	1,585	1,288	1,192	1,203	1,428	1,540	1,575	1,228
Okinawa	101	120	139	151	152	154	140	113	95	107	114	96
Nationwide	11,708	**11,744**	**12,322**	**15,160**	**15,550**	**12,922**	**12,096**	**13,005**	**14,187**	**15,577**	**15,055**	**13,118**

* "Nationwide Peak Demand" means the maximum of the aggregated demand in a given period for regional service areas of 10 GT&D companies, not the addition of each regional peak demand.

* The value in red is the maximum monthly peak demand (i.e., the annual peak demand) and the value in blue is the lowest monthly peak demand for each regional service area, respectively.

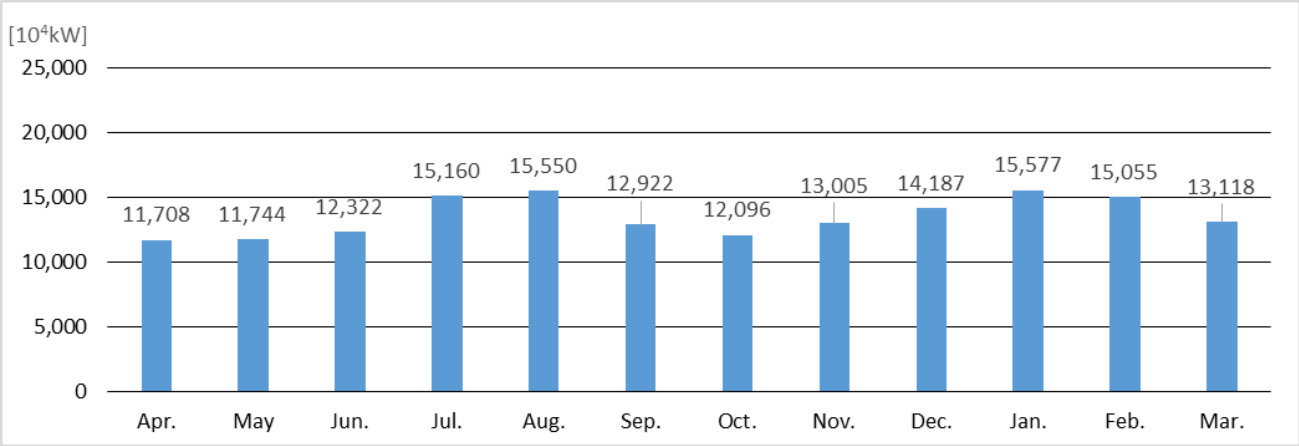


Figure 1-2: Nationwide Monthly Peak Demand (FY 2017)

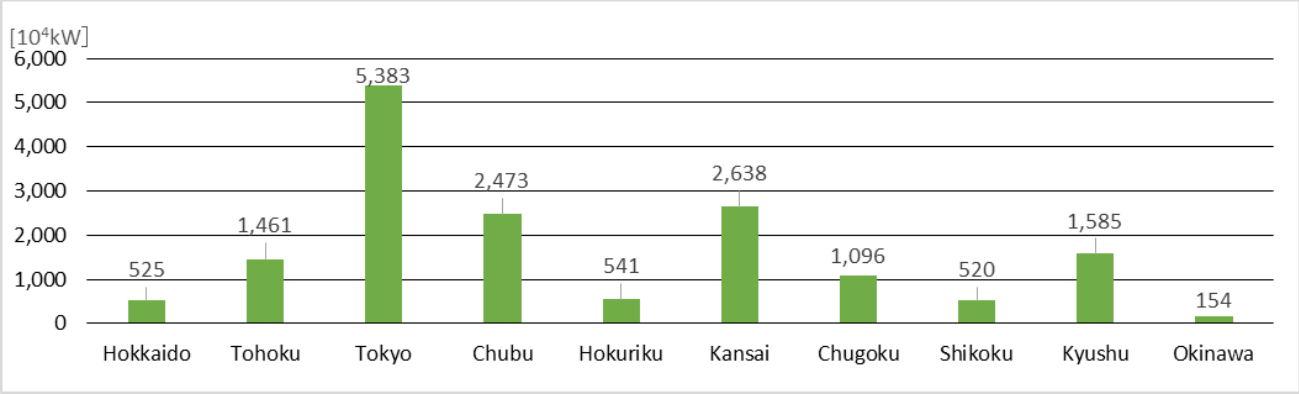


Figure 1-3: Annual Peak Demand for Regional Service Areas (FY 2017)

4. Actual Nationwide Electric Energy Requirements

Table 1-4 shows the monthly electric energy requirements for regional service areas in FY 2017. Figures 1-4 and 1-5 show the nationwide monthly electric energy requirements, and annual electric energy requirements for regional service areas, respectively.

Table 1-4: Monthly Electric Energy Requirements for Regional Service Areas (FY 2017)

[GWh]

	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Annual
Hokkaido	2,380	2,220	2,147	2,433	2,345	2,227	2,408	2,660	3,246	3,226	2,982	2,879	31,153
Tohoku	6,231	6,018	5,964	6,918	6,646	6,076	6,386	6,889	8,146	8,466	7,776	7,360	82,878
Tokyo	21,207	20,999	21,733	26,843	25,731	22,328	22,158	22,766	26,578	27,809	25,535	23,806	287,494
Chubu	10,066	9,824	10,395	12,378	12,150	10,737	10,532	10,862	12,471	12,766	11,961	11,399	135,543
Hokuriku	2,289	2,171	2,213	2,616	2,570	2,276	2,304	2,503	2,949	3,113	2,864	2,668	30,536
Kansai	10,783	10,762	11,009	13,819	13,839	11,386	11,187	11,545	13,514	14,095	13,043	12,184	147,166
Chugoku	4,487	4,408	4,502	5,568	5,575	4,675	4,670	4,979	5,949	6,092	5,613	5,239	61,757
Shikoku	2,088	2,041	2,107	2,636	2,676	2,150	2,169	2,250	2,640	2,756	2,533	2,353	28,399
Kyushu	6,294	6,246	6,563	8,460	8,514	6,818	6,643	6,738	8,200	8,527	7,710	7,082	97,795
Okinawa	565	642	731	886	927	820	750	590	577	589	541	566	8,182
Nationwide	**66,389**	65,332	**67,365**	**82,556**	**80,972**	**69,495**	**69,207**	**71,783**	**84,271**	**87,438**	**80,560**	**75,536**	**900,902**

* The value in red is the maximum monthly energy requirement and the value in blue is the lowest monthly energy requirement for each regional service area, respectively.

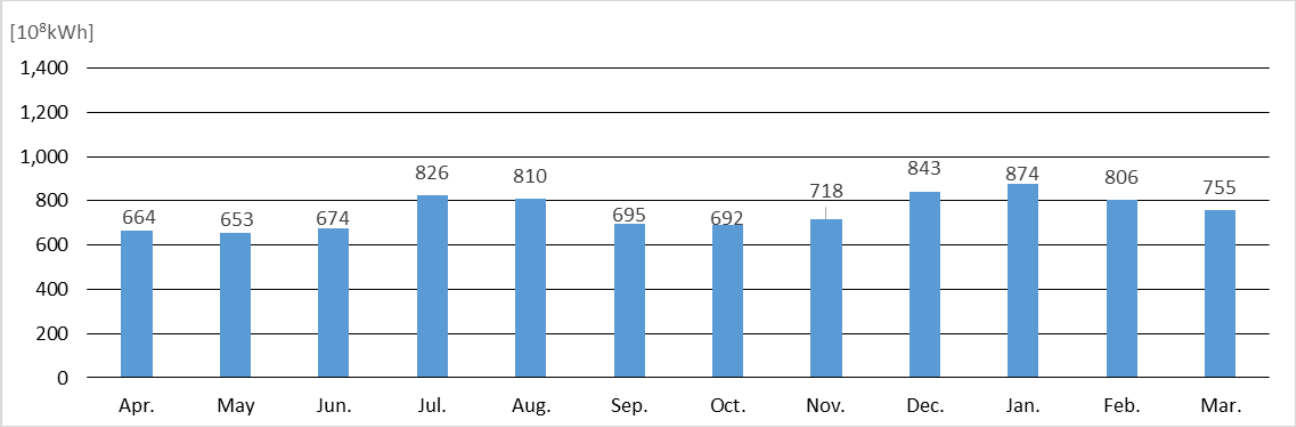


Figure 1-4: Nationwide Monthly Electric Energy Requirements (FY 2017)

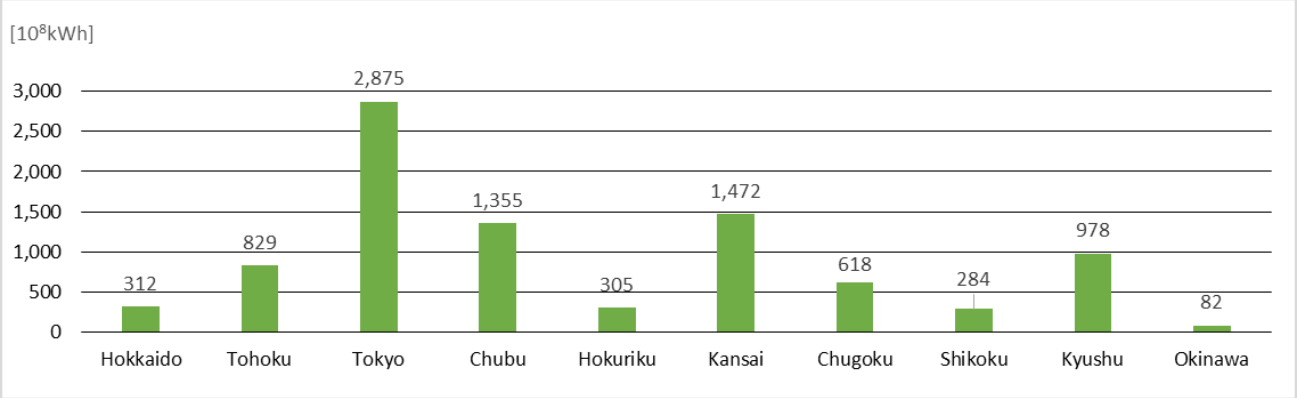


Figure 1-5: Annual Electric Energy Requirements for Regional Service Areas (FY 2017)

5. Nationwide Load Factor

The load factor describes the ratio of average demand to peak demand in a given period. Table 1-5 shows the monthly load factor for regional service areas in FY 2017,and Figures 1-6 and 1-7 show the nationwide monthly load factor*, and the annual load factor for regional service areas, respectively.

Table 1-5: Monthly Load Factor for Regional Service Areas (FY 2017)

[%]

	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Annual
Hokkaido	81.4	83.4	84.3	75.5	78.6	79.8	76.5	79.0	85.3	82.6	89.2	77.0	**67.8**
Tohoku	81.9	80.0	78.2	71.4	69.6	79.0	80.3	77.8	79.8	77.9	83.8	77.4	**64.8**
Tokyo	72.0	72.7	73.6	71.5	64.3	70.7	73.4	74.2	78.2	72.9	72.2	70.8	**61.0**
Chubu	74.3	69.5	73.4	71.0	66.0	71.5	71.8	75.4	75.6	72.2	76.1	75.3	**62.6**
Hokuriku	82.2	74.4	75.2	70.1	69.5	75.1	78.2	78.6	79.4	77.3	82.4	79.3	**64.4**
Kansai	80.2	74.2	74.9	70.9	70.5	71.8	73.7	75.9	76.9	74.0	77.1	76.8	**63.7**
Chugoku	80.8	75.6	76.3	72.4	69.9	74.9	77.4	77.5	78.0	74.7	77.6	79.3	**64.3**
Shikoku	80.8	75.8	75.7	68.2	69.2	71.8	74.2	76.8	75.8	72.9	74.5	77.8	**62.4**
Kyushu	83.9	78.3	71.3	72.8	72.2	73.5	74.9	77.8	77.2	74.4	72.9	77.5	**70.4**
Okinawa	77.5	72.1	73.1	78.9	81.7	74.1	72.0	72.6	81.9	74.0	70.4	79.5	**60.8**
Nationwide	**78.8**	**74.8**	**75.9**	**73.2**	**70.0**	**74.7**	**76.9**	**76.7**	**79.8**	**75.5**	**79.6**	**77.4**	**66.0**

* "Nationwide load factor" refers to the load factor calculated for Japan, and not the average of each regional load factor.

* The value in blue is the lowest monthly load factor for each regional service area.

$$\text{* Monthly Load Factor (\%)} = \frac{\text{Monthly Energy Requirement}}{\text{Monthly Peak Demand} \times \text{Calendar Hours (24H} \times \text{Monthly Days)}}$$

$$\text{* Annual Load Factor (\%)} = \frac{\text{Annual Energy Requirement}}{\text{Annual Peak Demand} \times \text{Calendar Hours (24H} \times \text{Annual Days)}}$$

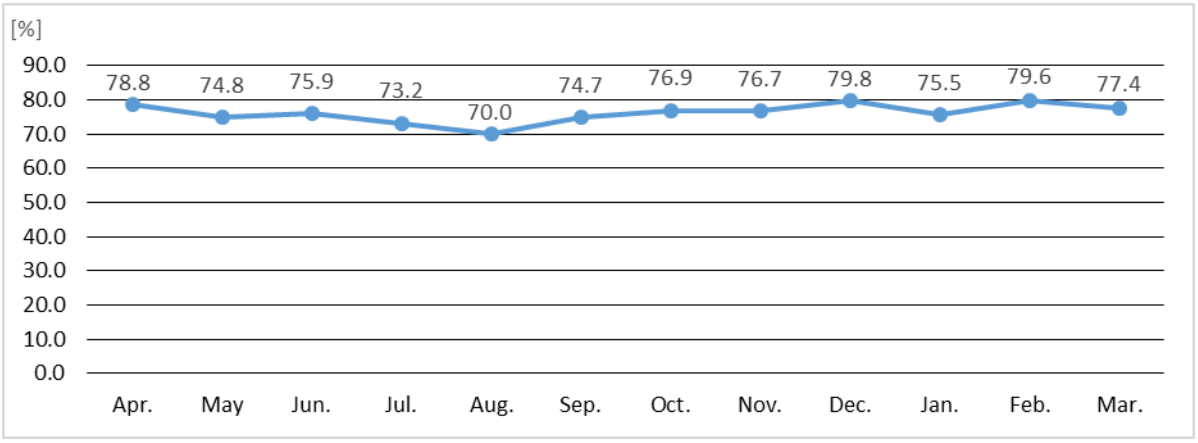


Figure 1-6: Nationwide Monthly Load Factor (FY 2017)

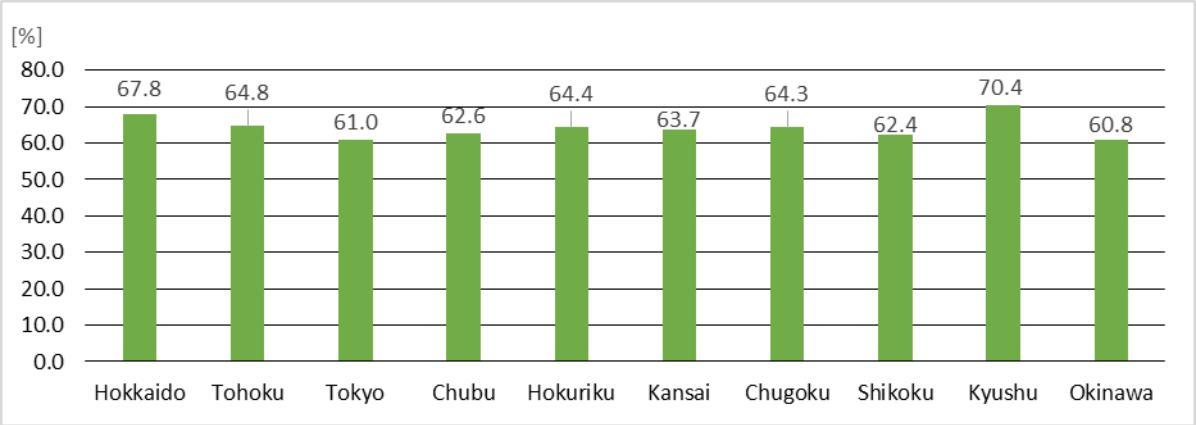


Figure 1-7: Annual Load Factor for Regional Service Areas (FY 2017)

6. Nationwide Supply–Demand Status during Peak Demand

(1) Nationwide Supply–Demand Status during the Summer Peak Demand Period (July to September)

Table 1-6 shows the supply–demand status during the summer peak demand period for regional service areas in FY 2017.

Table 1-6: Supply–Demand Status during the Summer Peak Demand Period for Regional Service Areas (FY 2017)

	Peak Demand [10^4kW]	Occurrence Date & Time			Daily Maximum Temperature [℃]	Supply Capacity [10^4kW]	Reserve Capacity [10^4kW]	Reserve Margin (%)	Daily Energy Supply [10^4kWh]	Daily Load Facter [%]
Hokkaido	433	7/14	Fri.	17	34.9	520	87	20.0	8,735	84.0
Tohoku	1,302	7/21	Fri.	17	31.8	1,517	216	16.6	25,492	81.6
Tokyo	5,383	8/9	Wed.	14	37.1	6,316	934	17.4	100,300	77.6
Chubu	2,473	8/24	Thur.	15	35.5	2,740	267	10.7	46,744	78.8
Hokuriku	502	7/21	Fri.	15	37.2	584	83	16.5	9,826	81.6
Kansai	2,638	8/24	Thur.	17	35.0	2,866	228	8.7	51,092	80.7
Chugoku	1,072	8/24	Thur.	15	34.8	1,190	117	10.9	20,563	79.9
Shikoku	520	8/25	Fri.	17	35.8	577	57	11.0	9,820	78.7
Kyushu	1,585	8/1	Tue.	15	34.1	2,022	436	27.5	30,251	79.5
Okinawa	154	9/11	Mon.	14	33.7	202	48	31.4	3,042	82.5
Nationwide	**15,550**	**8/24**	**Thur.**	**15**	-	**17,716**	**2,165**	**13.9**	**300,493**	**80.5**

* The daily maximum temperatures are provided by the Japan Meteorological Agency based on the data for the cities where the headquarters of GT&D companies, except the Okinawa EPCO, are located. (For the regional service area of the Okinawa EPCO, the data from Naha, prefectural capital of Okinawa were used instead).

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

* "Supply capacity" in the table above refers to the maximum power that can be generated during peak demand. This capacity is the addition of installed generating capacity including the deducted portion, such as generator suspension for maintenance work, derating with the decrease in river flow, and unplanned generator outages.

(2) Nationwide Supply–Demand Status during the Winter Peak Demand Period (December to February)

Table 1-7 shows the supply–demand status during the winter peak demand period for regional service areas in FY 2017.

Table 1-7: Supply–Demand Status during the Winter Peak Demand Period for Regional Service Areas (FY 2017)

	Peak Demand [10^4kW]	Occurrence Date & Time			Daily Maximum Temperature [℃]	Supply Capacity [10^4kW]	Reserve Capacity [10^4kW]	Reserve Margin (%)	Daily Energy Supply [10^4kWh]	Daily Load Facter [%]
Hokkaido	525	1/25	Thur.	10	-7.1	599	74	14.1	11,776	93.5
Tohoku	1,461	1/24	Wed.	18	-2.7	1,545	84	5.7	31,708	90.4
Tokyo	5,266	2/2	Fri.	11	1.9	5,564	298	5.7	106,342	84.1
Chubu	2,378	1/25	Thur.	18	-1.1	2,563	185	7.8	49,810	87.3
Hokuriku	541	1/25	Thur.	10	-2.9	614	72	13.3	12,085	93.0
Kansai	2,560	1/24	Wed.	19	0.2	2,762	202	7.9	52,323	85.2
Chugoku	1,096	1/25	Thur.	10	0.2	1,256	159	14.5	22,993	87.4
Shikoku	508	1/24	Wed.	19	0.0	542	34	6.7	10,329	84.7
Kyushu	1,575	2/6	Tue.	19	0.5	1,771	197	12.5	33,130	87.7
Okinawa	114	2/5	Mon.	20	11.5	155	41	35.8	2,237	81.6
Nationwide	**15,577**	**1/25**	**Thur.**	**19**	**-**	**16,915**	**1,339**	**8.6**	**330,605**	**88.4**

* The daily maximum temperatures are provided by the Japan Meteorological Agency based on the data for the cities where the headquarters of GT&D companies, except the Okinawa EPCO, are located. (For the regional service area of the Okinawa EPCO, the data from Naha, prefectural capital of Okinawa were used instead).

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

* "Supply capacity" in the table above refers to the maximum power that can be generated during peak demand. This capacity is the addition of installed generating capacity including the deducted portion, such as generator suspension for maintenance work, derating with the decrease in river flow, and unplanned generator outages.

7. Nationwide Bottom Demand Period

Table 1-8 shows the status of the bottom demand period for regional service areas (FY 2017).

Table 1-8: Bottom Demand Period for Regional Service Areas (FY 2017)

	Bottom Demand [10^4kW]	Occurrence Date & Time			Daily Mean Temperature [℃]	Daily Energy Supply [10^4kWh]
Hokkaido	232	5/7	Sun.	8	13.0	6,326
Tohoku	623	8/16	Wed.	2	20.6	18,518
Tokyo	1,977	5/5	Fri.	6	19.6	57,022
Chubu	875	5/4	Thur.	7	19.0	23,708
Hokuriku	204	5/5	Fri.	8	19.2	5,415
Kansai	1,051	5/7	Sun.	7	20.6	29,158
Chugoku	449	5/6	Sat.	24	21.2	11,994
Shikoku	195	5/7	Sun.	8	22.2	5,560
Kyushu	619	5/8	Mon.	1	21.1	19,659
Okinawa	59	4/23	Sun.	7	21.5	1,718
Nationwide	**6,477**	**5/5**	**Fri.**	**2**	**-**	**176,874**

* The daily maximum temperatures are provided by the Japan Meteorological Agency based on the data for the cities where the headquarters of GT&D companies, except the Okinawa EPCO, are located. (For the regional service area of the Okinawa EPCO, the data for Naha, prefectural capital of Okinawa were used instead).

8. Nationwide Peak Daily Energy Supply

Tables 1-9 and 1-10 show the summer peak daily energy supply for regional service areas in FY 2017 (July to September) and the winter peak daily energy supply for regional service areas in FY 2017 (December to the following February), respectively.

Table 1-9: Summer Peak Daily Energy Supply for Regional Service Areas (FY 2017)

	Peak Daily Energy Supply [10^4kWh]	Occurrence Date		Daily Mean Temperature [°C]
Hokkaido	8,735	7/14	Fri.	27.7
Tohoku	25,492	7/21	Fri.	26.6
Tokyo	100,300	8/9	Wed.	30.0
Chubu	46,744	8/24	Thur.	30.8
Hokuriku	9,826	7/21	Fri.	30.5
Kansai	51,157	8/25	Fri.	31.2
Chugoku	20,563	8/24	Thur.	34.8
Shikoku	9,820	8/25	Fri.	31.7
Kyushu	30,881	8/4	Fri.	32.2
Okinawa	3,162	8/1	Tue.	31.1
Nationwide	**301,094**	**8/25**	**Fri.**	-

Table 1-10: Winter Peak Daily Energy Supply for Regional Service Areas (FY 2017)

	Peak Daily Energy Supply [10^4kWh]	Occurrence Date		Daily Mean Temperature [°C]
Hokkaido	11,776	1/25	Thur.	-7.1
Tohoku	32,217	1/25	Thur.	-3.7
Tokyo	106,342	2/2	Fri.	1.9
Chubu	49,810	1/25	Thur.	-1.1
Hokuriku	12,085	1/25	Thur.	-2.9
Kansai	53,597	1/25	Thur.	0.8
Chugoku	23,133	1/24	Wed.	-0.8
Shikoku	10,579	2/6	Tue.	0.3
Kyushu	33,130	2/6	Tue.	0.5
Okinawa	2,237	2/5	Mon.	11.5
Nationwide	**330,605**	**1/25**	**Thur.**	-

* The daily maximum temperatures are provided by the Japan Meteorological Agency based on the data for the cities where the headquarters of GT&D companies, except the Okinawa EPCO, are located. (For the regional service area of the Okinawa EPCO, the data for Naha, prefectural capital of Okinawa were used instead).

9. Actual Power Exchange Instructed by the Organization

According to the provisions of paragraph 1 of Article 28-44 of the Electricity Business Act, the Organization may, when it finds it necessary to improve the electricity supply–demand status, require members such as electric power companies to undertake certain necessary actions, if the status of the electricity supply-demand from an electricity business conducted by a member has worsened or is likely to worsen.

During FY 2017, the Organization required the EPCOs to exchange power 10 times (Table 1-11) according to items 1 to 3, paragraph 1 of Article 111 of the Operational Rules.

In addition, according to items 4 and 5, paragraph 1 of Article 111, the Organization shall instruct the member to lend, deliver, borrow, or share electrical facilities to or from other members, and take the necessary steps to improve their supply–demand status, in addition to the directions; however, no actual instructions were provided.

Table 1-11: Actual Power Exchange Instructions by the Organization (FY 2017)

i.	Date	January 23, 2018 at 21:30
	Instruction	・Tohoku EPCO shall supply 1,400 MW of electricity at most to TEPCO PG from 22:00 till 24:00 on January 23. ・Chubu EPCO shall supply 300 MW of electricity at most to TEPCO PG from 22:00 till 24:00 on January 23. ・TEPCO PG shall be supplied 1,700 MW of electricity at most by Tohoku, and Chubu EPCO from 22:00 till 24:00 on January 23.
	Background	The supply–demand status may degrade without power exchanges through cross-regional interconnection lines because of demand growth caused by the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plants.
ii.	Date	January 23, 2018 at 22:48
	Instruction	・Tohoku EPCO shall supply 1,490 MW of electricity at most to TEPCO PG from 0:00 till 6:00 on January 24. ・Chubu EPCO shall supply 520 MW of electricity at most to TEPCO PG from 0:00 till 6:00 on January 24. ・TEPCO PG shall be supplied 2,000 MW of electricity at most by Tohoku, and Chubu EPCO from 0:00 till 6:00 on January 24.
	Background	The supply–demand status may degrade without power exchanges through cross-regional interconnection lines because of demand growth caused by the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plants.
iii.	Date	January 24, 2018 at 01:51
	Instruction	・Hokkaido EPCO shall supply 100 MW of electricity at most to TEPCO PG from 6:00 till 24:00 on January 24. ・Tohoku EPCO shall supply 1,300 MW of electricity at most to TEPCO PG from 6:00 till 24:00 on January 24. ・The Kansai EPCO shall supply 600 MW of electricity at most to TEPCO PG from 7:30 till 22:30 on January 24. ・The Chugoku EPCO shall supply 100 MW of electricity at most to TEPCO PG from 17:00 till 20:00 on January 24. ・Kyushu EPCO shall supply 200 MW of electricity at most to TEPCO PG from 17:00 till 19:00 on January 24. ・TEPCO PG shall be supplied 2,000 MW of electricity at most by Hokkaido, Tohoku, the Kansai, the Chugoku, and Kyushu EPCO from 6:00 till 24:00 on January 24.
	Background	The supply–demand status may degrade without power exchanges through cross-regional interconnection lines because of demand growth caused by the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plants.

Table 1-11(continued): Actual Power Exchange Instructions by the Organization (FY 2017)

iv.	Date	January 25 2018 at 16:30
	Instruction	・Tohoku EPCO shall supply 1,000 MW of electricity at most to TEPCO PG from 17:00 till 24:00 on January 25. ・Chubu EPCO shall supply 400 MW of electricity at most to TEPCO PG from 17:00 till 23:00 on January 25. ・The Kansai EPCO shall supply 280 MW of electricity at most to TEPCO PG from 17:00 till 18:00 on January 25. ・TEPCO PG shall be supplied 1,000 MW of electricity at most by Tohoku, Chubu, and the Kansai EPCO from 17:00 till 24:00 on January 25.
	Background	The supply–demand status may degrade without power exchanges through cross-regional interconnection lines because of demand growth caused by the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plants.
v.	Date	January 25, 2018 at 21:04
	Instruction	・Hokkaido EPCO shall supply 100 MW of electricity at most to TEPCO PG from 15:30 till 22:00 on January 26. ・Tohoku EPCO shall supply 1,000 MW of electricity at most to TEPCO PG from 0:00 till 24:00 on January 26. ・Chubu EPCO shall supply 490 MW of electricity at most to TEPCO PG from 16:30 till 22:00 on January 26. ・Hokuriku EPCO shall supply 35 MW of electricity at most to TEPCO PG from 17:30 till 18:00 on January 26. ・The Kansai EPCO shall supply 600 MW of electricity at most to TEPCO PG from 8:00 till 18:00 on January 26. ・TEPCO PG shall be supplied 1,370 MW of electricity at most by Hokkaido, Tohoku, Chubu, Hokuriku, and the Kansai EPCO from 0:00 till 24:00 on January 26.
	Background	The supply–demand status may degrade without power exchanges through cross-regional interconnection lines because of demand growth caused by the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plants.
vi. & vii.	Date	February 1, 2018 at 15:27 & 16:23
	Instruction	・Hokkaido EPCO shall supply 100 MW of electricity at most to TEPCO PG from 17:00 till 24:00 on February 1. ・Tohoku EPCO shall supply 1,600 MW of electricity at most to TEPCO PG from 16:00 till 24:00 on February 1. ・Chubu EPCO shall supply 500 MW of electricity at most to TEPCO PG from 16:00 till 24:00 on February 1. ・The Kansai EPCO shall supply 500 MW of electricity at most to TEPCO PG from 17:00 till 24:00 on February 1. ・TEPCO PG shall be supplied 2,630 MW of electricity at most by Hokkaido, Tohoku, Chubu, and the Kansai EPCO from 16:00 till 24:00 on February 1.
	Background	The supply–demand status may degrade without power exchanges through cross-regional interconnection lines because of demand growth caused by the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plants.
viii.	Date	February 1, 2018 at 21:44
	Instruction	・Hokkaido EPCO shall supply 100 MW of electricity at most to TEPCO PG from 0:00 till 7:00 on February 2. ・Tohoku EPCO shall supply 1,500 MW of electricity at most to TEPCO PG from 0:00 till 7:00 on February 2. ・Chubu EPCO shall supply 500 MW of electricity at most to TEPCO PG from 0:00 till 7:00 in February 2. ・The Kansai EPCO shall supply 1,000 MW of electricity at most to TEPCO PG from 0:00 till 7:00 on February 2. ・TEPCO PG shall be supplied 2,500 MW of electricity at most by Hokkaido, Tohoku, Chubu, and the Kansai EPCO from 0:00 till 7:00 on February 2.
	Background	The supply–demand status may degrade without power exchanges through cross-regional interconnection lines because of demand growth caused by the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plants.

Table 1-11(continued): Actual Power Exchange Instructions by the Organization (FY 2017)

ix.	Date	February 2, 2018 at 00:39
	Instruction	・Hokkaido EPCO shall supply 150 MW of electricity at most to TEPCO PG from 7:00 till 22:00 on February 2. ・Tohoku EPCO shall supply 2,000 MW of electricity at most to TEPCO PG from 7:00 till 24:00 on February 2. ・Chubu EPCO shall supply 500 MW of electricity at most to TEPCO PG from 7:00 till 23:00 on February 2. ・The Kansai EPCO shall supply 200 MW of electricity at most to TEPCO PG from 7:00 till 23:00 on February 2. ・TEPCO PG shall be supplied 2,000 MW of electricity at most by Hokkaido, Tohoku, Chubu, and the Kansai EPCO from 7:00 till 24:00 on February 2.
	Background	The supply–demand status may degrade without power exchanges through cross-regional interconnection lines because of demand growth caused by the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plants.
x.	Date	February 22, 2018 at 15:48
	Instruction	・Hokkaido EPCO shall supply 50 MW of electricity at most to TEPCO PG from 17:00 till 22:00 on February 22. ・Tohoku EPCO shall supply 700 MW of electricity at most to TEPCO PG from 16:00 till 22:00 on February 22. ・Chubu EPCO shall supply 400 MW of electricity at most to TEPCO PG from 16:00 till 22:00 on February 22. ・Hokuriku EPCO shall supply 38 MW of electricity at most to TEPCO PG from 19:30 till 20:00 on February 22. ・The Kansai EPCO shall supply 1,200 MW of electricity at most to TEPCO PG from 16:00 till 22:00 on February 22. ・TEPCO PG shall be supplied 2,020 MW of electricity at most by Hokkaido, Tohoku, Chubu, Hokuriku, and the Kansai EPCO from 16:00 till 22:00 on February 22.
	Background	The supply–demand status may degrade without power exchanges through cross-regional interconnection lines because of demand growth caused by the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plants.

10. Output Shedding of Renewable Energy-generating Facilities Operated by the Electric Power Companies other than GT&D Companies

GT&D companies may order renewable energy-generating facilities from other electric power companies to shed their output in case of expected oversupply to the demand for its regional service areas after shedding the output of generators other than renewable energy-generating facilities of the GT&D company according to the provision of the 'Ministerial Ordinance of Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources by Electric Utilities.'
Table 1-12 shows the actual output shedding of renewable energy-generating facilities in FY 2017.

Table 1-12: Actual Output Shedding of Renewable Energy-generating Facilities (FY 2017)

Month/Year	Regional Service Area	Output Shedding Period		Total Capacity Shed	Background
April, 2017	Kyushu EPCO (Tanegashima Island)	Saturday, April 1	from 9:00 till 16:00	1,280 kW	Possible insufficiency of ability to reduce power supply[*1] is expected.
		Sunday, April 2		2,150 kW	
		Monday, April 3		1,470 kW	
		Tuesday, April 4		580 kW	
		Wednesday, April 12		1,840 kW	
		Thursday, April 13		1,670 kW	
		Friday, April 14		1,760 kW	
		Wednesday, April 19		2,350 kW	
		Sunday, April 23		2,360 kW	
		Friday, April 28		2,280 kW	
		Saturday, April 29		2,430 kW	
		Sunday, April 30		2,800 kW	
	Kyushu EPCO (Iki Island)	Wednesday, April 12	from 9:00 till 16:00	420 kW	
		Friday, April 14		820 kW	
		Wednesday, April 19		1,070 kW	
		Saturday, April 22		1,190 kW	
		Sunday, April 23		1,370 kW	
		Monday, April 24		750 kW	
		Friday, April 28		980 kW	
		Saturday, April 29		1,250 kW	
		Sunday, April 30		1,910 kW	
	Kyushu EPCO (Tokunoshima Island)	Saturday, April 29	from 9:00 till 16:00	660 kW	
		Sunday, April 30		390 kW	

Table 1-12(continued): Actual Output Shedding of Renewable Energy-generating Facilities (FY 2017)

Month/Year	Regional Service Area	Output Shedding Period		Total Capacity Shed	Background
May, 2017	Kyushu EPCO (Tanegashima Island)	Thursday, May 11	from 9:00 till 16:00	970 kW	Possible insufficiency of ability to reduce power supply[*1] is expected.
		Sunday, May 14		1,800 kW	
		Thursday, May 18		1,080 kW	
		Friday, May 19		1,100 kW	
		Saturday, May 20		730 kW	
	Kyushu EPCO (Iki Island)	Saturday, May 6	from 9:00 till 16:00	1,160 kW	
		Sunday, May 7		1,900 kW	
		Sunday, May 14		1,240 kW	
		Wednesday, May 17		550 kW	
		Thursday, May 18		1,090 kW	
		Friday, May 19		790 kW	
		Monday, May 22		140 kW	
		Friday, May 26		390 kW	
		Saturday, May 27		390 kW	
		Sunday, May 28		690 kW	
November, 2017	Kyushu EPCO (Tanegashima Island)	Saturday, November 4	from 9:00 till 16:00	1,700 kW	
		Saturday, November 11		550 kW	
		Sunday, November 19		1,240 kW	
		Thursday, November 23		1,410 kW	
	Kyushu EPCO (Iki Island)	Sunday, November 5	from 9:00 till 16:00	370 kW	
December, 2017	Kyushu EPCO (Tanegashima Island)	Saturday, December 23	from 9:00 till 16:00	410 kW	
January, 2018	Kyushu EPCO (Tanegashima Island)	Monday, January 1	from 9:00 till 16:00	1,470 kW	
		Tuesday, January 2		820 kW	
		Saturday, January 6		110 kW	
		Thursday, January 18		960 kW	
		Saturday, January 20		1,700 kW	
February, 2018	Kyushu EPCO (Tanegashima Island)	Saturday, February 17	from 9:00 till 16:00	2,530 kW	
		Sunday, February 18		1,670 kW	
		Friday, February 23		1,890 kW	
		Monday, February 26		2,370 kW	
		Tuesday, February 27		880 kW	

Table 1-12(continued): Actual Output Shedding of Renewable Energy-generating Facilities (FY 2017)

Month/Year	Regional Service Area	Output Shedding Period		Total Capacity Shed	Background
March, 2018	Kyushu EPCO (Tanegashima Island)	Thursday, March 1	from 9:00 till 16:00	1,820 kW	Possible insufficiency of ability to reduce power supply*1 is expected.
		Tuesday, March 6		980 kW	
		Friday, March 9		2,790 kW	
		Saturday, March 10		2,930 kW	
		Sunday, March 11		4,100 kW	
		Monday, March 12		530 kW	
		Tuesday, March 13		1,890 kW	
		Wednesday, March 14		3,270 kW	
		Saturday, March 17		860 kW	
		Thursday, March 22		150 kW	
		Friday, March 23		1,420 kW	
		Saturday, March 24		4,520 kW	
		Sunday, March 25		2,180 kW	
		Monday, March 26		1,560 kW	
		Tuesday, March 27		1,250 kW	
		Wednesday, Mar. 28		1,730 kW	
		Thursday, March 29		3,830 kW	
		Friday, March 30		1,130 kW	
		Saturday, March 31		1,830 kW	
	Kyushu EPCO (Iki Island)	Saturday, March 24	from 9:00 till 16:00	190 kW	
		Friday, March 30		1,130 kW	
		Saturday, March 31		930 kW	
	Kyushu EPCO (Tokunoshima Island)	Saturday, March 24	from 9:00 till 16:00	260 kW	
		Sunday, March 25		150 kW	

*1 “Insufficient ability to reduce the power supply” describes the case where “balancing capacity for redundancy”*2 becomes insufficient in regional service areas, and members who are GT&D companies cannot resolve the electricity surplus even by suppressing the output from power generators that cannot be adjusted online.

*2 “Balancing capacity for redundancy” describes the 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: ADTUAL UTILIZATION OF CROSS-REGIONAL INTERCONNECTION LINES

1. Cross-regional Interconnection Lines and their Management

(1) Cross-regional Interconnection Lines

"Cross-regional interconnection lines" describes transmission lines with 250 kV or more and AC/DC convertors that firmly connect the regional service areas of members who are GT&D companies. Electric power supply outside each service area is made available through the interconnection lines. The Organization directs members to supply electricity through the cross-regional interconnection lines and secure the supply–demand balance at the insufficient supply capacity for each regional service area. Figure 2-1 and Table 2-1 show the cross-regional interconnection lines in Japan.

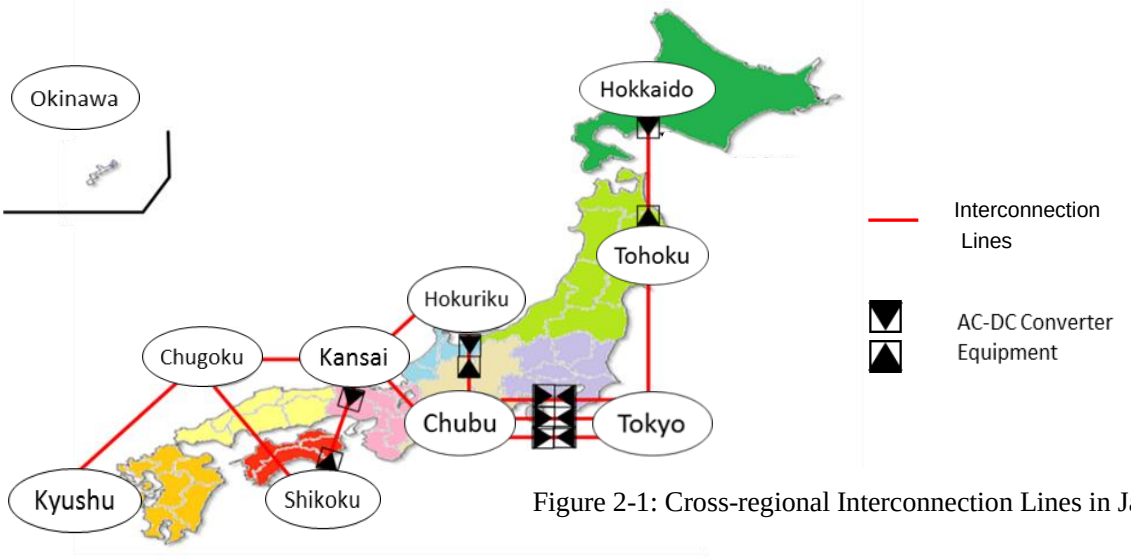


Figure 2-1: Cross-regional Interconnection Lines in Japan

Table 2-1: Summary of Cross-regional Interconnection Lines

Interconnection Lines	Areas・Directions				Corresponding Facilities	AC/DC
Interconnection facilities between Hokkaido and Honshu	Forward	Hokkaido	→	Tohoku	Hokkaido-Honshu HVDC Link	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 Shin Shinano FC 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 manages the interconnection lines according to the Operational Rules using the following procedures.

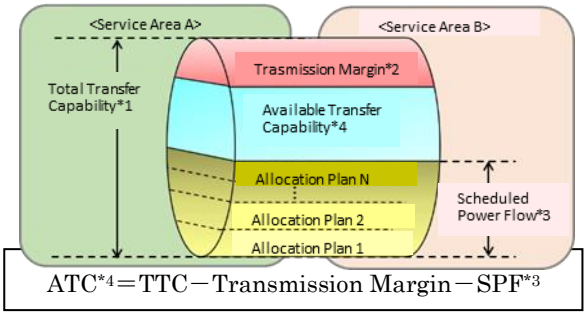


Figure 2-2: Management of Interconnection Lines

(a) Establishment of Total Transfer Capability (TTC)*1 and Transmission Margin*2

(b) Management of Scheduled Power Flow (SPF) of Interconnection Line

i. The Organization receives the submission of a plan specifying the capability to utilize the desired interconnection line (hereinafter, request plan) and deliver them to the GT&D companies related to the relevant interconnection lines (hereinafter, relevant GT&D companies).

ii. The Organization judges whether the request plans of the interconnection line are acceptable for registration for the scheduled power flow*3 (such judgment shall be called "determination of transfer capability allocation" hereinafter). There are "forward flows" and "counter flows" in the "capability allocation plan." However, the actual flows on the transmission lines are offset in each direction. Thus, scheduled power flows are the offset figure between forward flows and counter flows, not the simple addition of each direction.

iii. When the Organization determines that the requested plans of the interconnection lines are acceptable for transmission after determining the transfer-capability allocation, it registers such plans for a scheduled power flow (called "capability registration").

iv. When the Organization conducts capability registration, it notifies the applicants for interconnection use and the relevant GT&D companies (requested plan for the interconnected lines on which capability registration was conducted shall be called the "capability allocation plan of the interconnection lines").

(c) Revision and Change in the Capability Allocation Plan

(d) Congestion*5 Management

When congestion occurs on the interconnection line, the Organization takes steps to dissolve the congestion by following capability allocation plans and the reported figures registered for a scheduled power flow. When the Organization manages the congestion, it notifies the interconnection line users with a decreased capability allocation plan for the interconnection line or reported figures, and the relevant GT&D companies about the decreased line cross-section and capability.

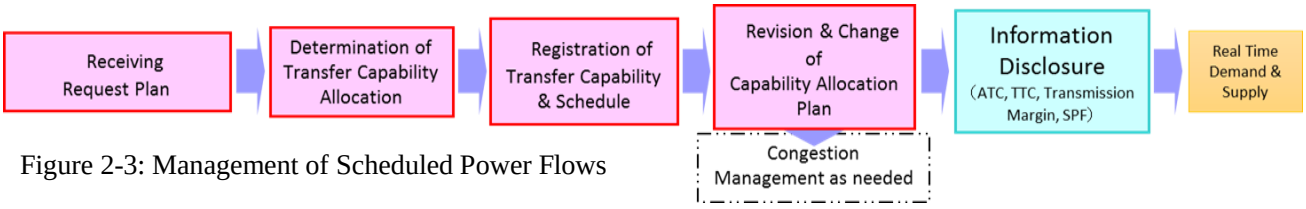


Figure 2-3: Management of Scheduled Power Flows

*1 TTC describes 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" describes the electricity capability managed by the Organization as a part of the TTC of the interconnection lines to receive electricity from other regional service areas through the interconnection lines under abnormal states of the electric network, supply shortages or other emergent states, to ensure that the electric network remains stabilized, or to develop a market trading environment for electricity.

*3 "Scheduled power flow" describes the electricity capacity managed by the Organization as the total capability registered by interconnection line users.

*4 "Available transfer capability" (ATC) describes the TTC of the interconnection lines managed by the Organization minus the capability secured for transmission margin, scheduled power flow, and cross-regional frequency control.

*5 "Congestion" refers to the condition where the ATC becomes negative.

2. Actual Utilization of Cross-regional Interconnection Lines

The following are the actual utilization of cross-regional interconnection lines that are managed according to the provision of Article 124 of the Operational Rules.

(1) Actual Utilization of Cross-regional Interconnection Lines in FY 2017

Table 2-2 and Figure 2-4 show the monthly utilization of cross-regional interconnection lines for regional service areas in FY 2017.

Table 2-2: Monthly Utilization of Cross-regional Interconnection Lines for Regional Service Areas (FY 2017)

[GWh]

		Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	**Annual**
Hokkaido - Honshu	→Tohoku (Forward)	39	14	11	44	20	12	13	4	14	62	103	3	**340**
	→Hokkaido (Counter)	140	111	125	137	95	69	40	91	123	122	110	107	**1,270**
Tohoku-Tokyo	→Tokyo (Forward)	1,557	2,038	2,242	2,840	2,837	2,212	2,082	2,098	2,410	3,002	2,381	2,538	**28,238**
	→Tohoku (Counter)	467	462	467	636	586	546	574	688	784	705	702	457	**7,071**
Tokyo-Chubu	→Chubu (Forward)	118	96	164	167	326	222	267	369	587	688	644	306	**3,954**
	→Tokyo (Counter)	372	306	449	424	513	490	442	336	338	433	601	623	**5,328**
Chubu-Kansai	→Kansai (Forward)	277	388	650	514	629	522	517	774	1,040	948	1,031	816	**8,106**
	→Chubu (Counter)	693	594	719	847	1,010	912	893	776	815	842	866	924	**9,889**
Chubu-Hokuriku	→Hokuriku (Forward)	28	2	55	8	24	8	12	18	23	72	75	27	**353**
	→Chubu (Counter)	14	4	7	2	7	6	9	10	10	12	12	15	**108**
Hokuriku - Kanasai	→Kansai (Forward)	102	120	93	193	406	490	352	306	204	242	175	265	**2,949**
	→Hokuriku (Counter)	122	42	219	115	71	38	41	48	108	162	172	123	**1,260**
Kansai-Chugoku	→Chugoku (Forward)	103	137	275	278	236	280	242	281	685	638	657	680	**4,493**
	→Kansai (Counter)	1,556	1,352	1,424	1,565	1,677	1,506	1,462	1,230	1,250	1,285	1,089	1,330	**16,727**
Kansai-Shikoku	→Shikoku (Forward)	0	0	0	0	0	0	0	0	0	0	0	1	**1**
	→Kansai (Counter)	481	480	716	983	899	953	983	932	940	928	740	476	**9,510**
Chugoku-Shikoku	→Shikoku (Forward)	205	164	261	373	342	217	278	323	541	511	431	414	**4,061**
	→Chugoku (Counter)	688	650	640	739	864	786	653	584	592	555	419	370	**7,540**
Chugoku-Kyushu	→Kyushu (Forward)	116	111	259	295	279	320	228	252	292	216	284	362	**3,014**
	→Chugoku (Counter)	1,456	1,139	1,377	1,722	1,700	1,380	1,470	1,408	1,649	1,698	1,566	1,618	**18,183**

* Based on the scheduled power flows of cross-regional interconnection lines. The values are shown before offsetting is performed.
* The values in red are the annual maximum capabilities and the values in blue are the annual minimum capabilities for each line and direction, respectively.

Figure 2-4: Monthly Utilization of Cross-regional Interconnection Lines for Regional Service Areas (FY 2017)

(2) Actual Utilization of Cross-regional Interconnection Lines for FY 2010–2017

Table 2-3 and Figure 2-5 show the annual utilization of cross-regional interconnection lines for regional service areas for FY 2010–2017.

Table 2-3 Annual Utilization of Cross-regional Interconnection Lines for Regional Service Areas (FY 2010–2017)

[GWh]

		FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	**FY 2017**
Hokkaido-Honshu	→Tohoku (Forward)	972	3,925	214	182	143	146	237	**340**
	→Hokkaido (Counter)	12	7	673	505	617	804	1,033	**1,270**
Tohoku-Tokyo	→Tokyo (Forward)	27,519	9,454	16,084	22,450	21,273	22,587	23,097	**28,238**
	→Tohoku (Counter)	12,219	5,674	4,520	3,891	4,029	3,714	4,660	**7,071**
Tokyo-Chubu	→Chubu (Forward)	188	1,151	1,579	2,829	2,702	693	2,729	**3,954**
	→Tokyo (Counter)	1,271	2,426	1,288	536	2,755	4,513	5,144	**5,328**
Chubu-Kansai	→Kansai (Forward)	943	3,734	7,487	7,049	7,131	3,412	5,538	**8,106**
	→Chubu (Counter)	10,721	8,403	5,726	4,928	6,342	7,577	6,544	**9,889**
Chubu-Hokuriku	→Hokuriku (Forward)	117	169	452	170	231	108	241	**353**
	→Chubu (Counter)	2,310	130	183	310	296	172	59	**108**
Hokuriku-Kanasai	→Kansai (Forward)	4,957	1,127	1,590	1,406	2,265	2,047	2,033	**2,949**
	→Hokuriku (Counter)	2,850	730	464	587	491	502	640	**1,260**
Kansai-Chugoku	→Chugoku (Forward)	1,423	1,483	2,836	2,326	2,252	948	716	**4,493**
	→Kansai (Counter)	7,916	10,520	6,788	5,468	5,994	9,138	13,179	**16,727**
Kansai-Shikoku	→Shikoku (Forward)	0	0	208	0	1	2	2	**1**
	→Kansai (Counter)	9,299	9,810	8,938	9,073	9,362	9,611	8,856	**9,510**
Chugoku-Shikoku	→Shikoku (Forward)	2,502	3,475	3,575	3,583	2,677	3,423	3,294	**4,061**
	→Chugoku (Counter)	7,496	6,727	3,564	3,694	3,912	4,631	7,638	**7,540**
Chugoku-Kyushu	→Kyushu (Forward)	903	2,582	4,210	3,838	3,596	2,174	1,935	**3,014**
	→Chugoku (Counter)	13,095	13,905	13,596	13,847	11,218	14,947	15,476	**18,183**

* Based on the scheduled power flows of cross-regional interconnection lines

* The value in red is the annual maximum capability and the value in blue is the annual minimum capability in each line and direction for 8 years, respectively.

Figure 2-5: Annual Utilization of Cross-regional Interconnection Lines for Regional Service Areas (FY 2010–2017)

(3) Monthly Utilization of Cross-regional Interconnection Lines by Transaction in FY 2017

Table 2-4 shows the monthly utilization of cross-regional interconnection lines by transaction in FY 2017.

Table: 2-4 Monthly Utilization of Cross-regional Interconnection Lines by Transaction (FY 2017)

[GWh]

	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	**Annual**
Bilateral	7,099	7,022	8,542	9,735	9,954	8,924	8,873	8,777	10,522	11,030	9,939	9,424	**109,842**
Day-ahead	1,026	937	1,290	1,634	2,064	1,753	1,416	1,448	1,585	1,685	1,722	1,792	**18,350**
1 Hour-ahead	412	249	321	513	502	290	271	304	297	405	397	241	**4,203**

* The values in red are the annual maximum capability and the values in blue are the annual minimum capability, respectively.

(4) Annual Utilization of Cross-regional Interconnection Lines by Transaction for FY 2010–2017

Table 2-5 and Figures 2-6, 2-7, and 2-8 show the annual utilization of cross-regional interconnection lines by transaction for FY 2010–2017.

Table 2-5: Annual Utilization of Cross-regional Interconnection Lines by Transaction (FY 2010–2017) [GWh]

	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	**FY 2017**
Bilateral	100,444	79,693	76,328	73,289	71,558	75,947	84,843	**109,842**
Day-ahead	6,251	5,718	7,155	11,632	14,174	13,152	14,817	**18,350**
1 Hour-ahead	2	22	493	1,750	1,554	2,050	3,392	**4,203**

* "Hour-ahead" describes the transaction that is 4 hours ahead of the gate closure by FY 2015. From FY 2016, it refers to the transaction that is 1 hour ahead of the gate closure.

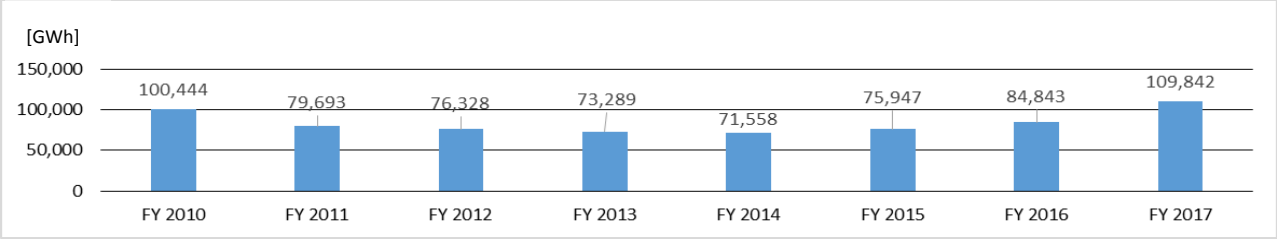


Figure 2-6: Annual Utilization of Cross-regional Interconnection Lines by Bilateral Transaction (FY 2010–2017)

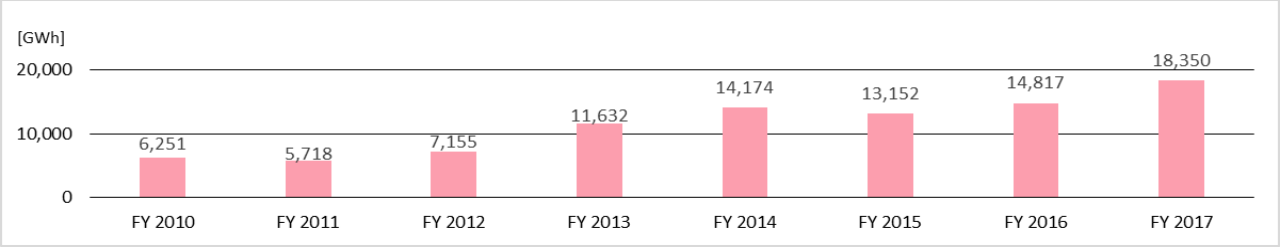


Figure 2-7: Annual Utilization of Cross-regional Interconnection Lines by Day-ahead Transaction (FY 2010–2017)

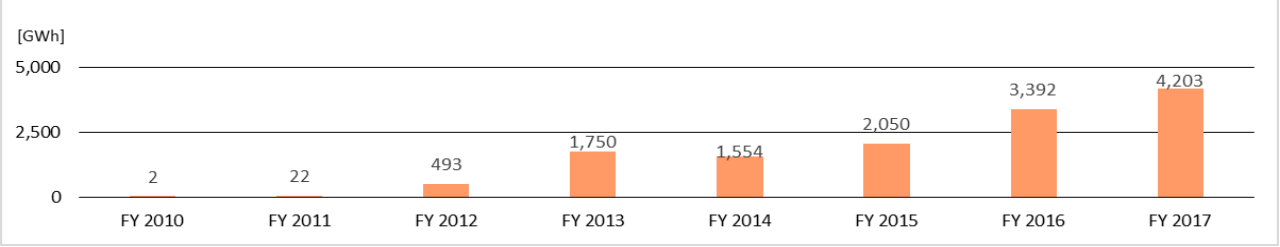


Figure 2-8: Annual Utilization of Cross-regional Interconnection Lines by Hour-ahead Transaction (FY 2010–2017)

3. Congestion Management and Constraints of Cross-regional Interconnection Lines

The following are the actual congestion management and constraints of cross-regional interconnection lines implemented according to the provision of Article 143 of the Operational Rules.

(1) Monthly Congestion Management of Cross-regional Interconnection Lines by Weekly Plan Submission in FY 2017

Table 2-6 shows the monthly congestion management of cross-regional interconnection lines by weekly plan submissions in FY 2017.

Table 2-6: Monthly Congestion Management of Cross-regional Interconnection Lines by Weekly Plan Submissions (FY 2017)

[h]

Interconnection	Weekly Plan Submission	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	**Annual**
Hokkaido-Honshu	Total	28	155	56	40	746	624	825	677	761	807	40	79	**4,836**
	Before Submission	0	120	56	40	480	562	604	0	0	744	0	0	**2,606**
	After Submission	28	35	0	0	266	62	221	677	761	63	40	79	**2,230**
Tohoku-Tokyo	Total	0	0	0	0	0	0	44	60	20	0	0	1	**125**
	Before Submission	0	0	0	0	0	0	44	60	20	0	0	0	**124**
	After Submission	0	0	0	0	0	0	0	0	0	0	0	1	**1**
Tokyo-Chubu	Total	1,708	2,157	2,081	2,063	1,062	1,625	1,526	3,320	4,013	3,223	3,438	4,376	**30,589**
	Before Submission	536	808	630	960	744	126	572	704	384	0	0	170	**5,634**
	After Submission	1,172	1,349	1,451	1,103	318	1,499	954	2,616	3,629	3,223	3,438	4,206	**24,955**
Chubu-Kansai	Total	0	0	0	0	0	0	0	0	0	19	23	343	**384**
	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	19	23	343	**384**
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	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-Chugoku	Total	0	0	0	0	0	0	0	5	0	0	0	0	**5**
	Before Submission	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	After Submission	0	0	0	0	0	0	0	5	0	0	0	0	**5**
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	475	1,446	652	882	874	603	629	371	395	1,215	1,019	861	**9,420**
	Before Submission	464	766	602	764	534	534	578	360	358	970	636	552	**7,118**
	After Submission	11	680	50	118	340	69	51	11	37	245	383	309	**2,302**
Nationwide		2,210	3,758	2,789	2,985	2,682	2,851	3,024	4,433	5,188	5,263	4,519	5,659	**45,358**
	Before Submission	1,000	1,694	1,288	1,764	1,758	1,222	1,798	1,124	762	1,714	636	722	**15,482**
	After Submission	1,210	2,064	1,501	1,221	924	1,629	1,226	3,309	4,426	3,549	3,883	4,937	**29,876**

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

(2) Annual Congestion Management of Cross-regional Interconnection Lines by Weekly Plan Submission for FY 2010–2017

Table 2-7 and Figure 2-9 show the annual congestion management of cross-regional interconnection lines by weekly plan submissions for FY 2010–2017.

Table 2-7: Annual Congestion Management of Cross-regional Interconnection Lines by Weekly Plan Submissions (FY 2010–2017)

[h]

	Weekly Plan Submission	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Annual
FY 2017	**Total**	2,210	3,758	2,789	2,985	2,682	2,851	3,024	4,433	5,188	5,263	4,519	5,659	**45,358**
	Before Submission	1,000	1,694	1,288	1,764	1,758	1,222	1,798	1,124	762	1,714	636	722	**15,482**
	After Submission	1,210	2,064	1,501	1,221	924	1,629	1,226	3,309	4,426	3,549	3,883	4,937	**29,876**
FY 2016	Total	533	1,006	123	221	136	422	703	467	499	508	12	541	**5,167**
	Before Submission	533	763	0	144	130	310	582	208	476	506	0	431	**4,083**
	After Submission	0	243	123	77	6	112	121	259	23	2	12	110	**1,085**
FY 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**
FY 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**
FY 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**
FY 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**
FY 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**
FY 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**

* The value in red is the annual maximum capability.
* The managed hours are collected as 30 minutes and rounded up to an hour.
* Total hours of utilization plans that managed to mitigate congestion.
* In-service dates of function for capability allocation plan revision of the Cross-regional Operation System are as below.
1. The function for revision of weekly capability allocation plan and its congestion management: September, 2016
2. The function for revision of monthly capability allocation plan and its congestion management: February, 2017

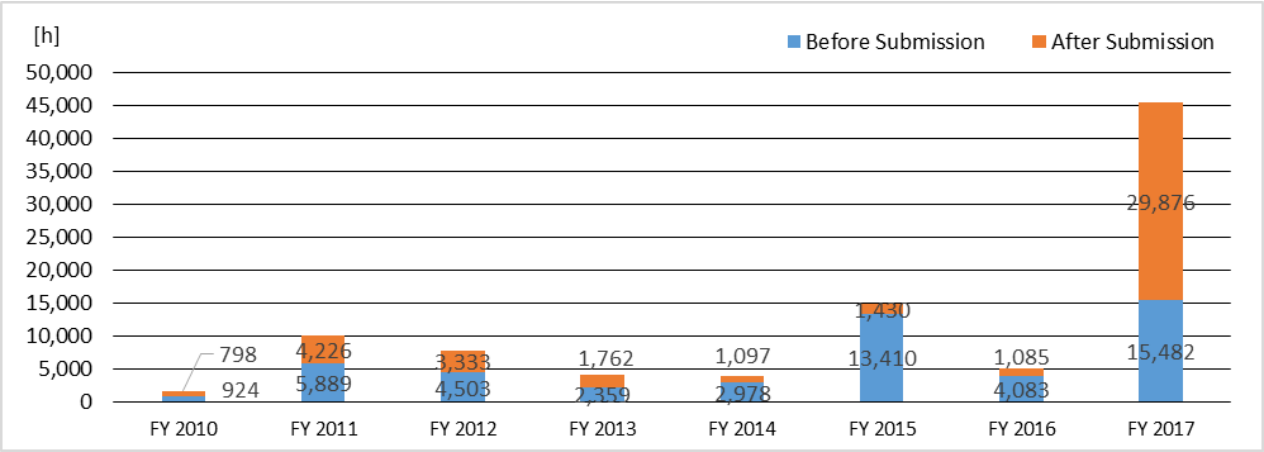


Figure 2-9: Annual Congestion Management of Cross-regional Interconnection Lines by Weekly Plan Submissions (FY 2010–2017)

(3) Monthly Congestion Management of Cross-regional Interconnection Lines by Constraints in FY 2017

Table 2-8 shows the monthly congestion management of cross-regional interconnection lines by constraints in FY 2017.

Table 2-8: Monthly Congestion Management of Cross-regional Interconnection Lines by Constraints (FY 2017)

[h]

Interconnection	Constraints	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	**Annual**
Hokkaido-Honshu	Total	28	155	56	40	746	624	825	677	761	807	40	79	**4,836**
	Over Capability	28	155	56	40	746	624	825	677	761	807	40	79	**4,836**
	Minimum Flow	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tohoku-Tokyo	Total	0	0	0	0	0	0	44	60	20	0	0	1	**125**
	Over Capability	0	0	0	0	0	0	44	60	20	0	0	1	**125**
	Minimum Flow	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Tokyo-Chubu	Total	1,708	2,157	2,081	2,063	1,062	1,625	1,526	3,320	4,013	3,223	3,438	4,376	**30,589**
	Over Capability	1,708	2,157	2,081	2,063	1,062	1,625	1,526	3,320	4,013	3,223	3,438	4,376	**30,589**
	Minimum Flow	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Chubu-Kansai	Total	0	0	0	0	0	0	0	0	0	19	23	343	**384**
	Over Capability	0	0	0	0	0	0	0	0	0	19	23	343	**384**
	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	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-Chugoku	Total	0	0	0	0	0	0	0	5	0	0	0	0	**5**
	Over Capability	0	0	0	0	0	0	0	5	0	0	0	0	**5**
	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	475	1,446	652	882	874	603	629	371	395	1,215	1,019	861	**9,420**
	Over Capability	475	1,446	652	882	874	603	629	371	395	1,215	1,019	861	**9,420**
	Minimum Flow	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		2,210	**3,758**	**2,789**	**2,985**	**2,682**	**2,851**	**3,024**	**4,433**	**5,188**	**5,263**	**4,519**	**5,659**	**45,358**
Nationwide	**Over Capability**	**2,210**	**3,758**	**2,789**	**2,985**	**2,682**	**2,851**	**3,024**	**4,433**	**5,188**	**5,263**	**4,519**	**5,659**	**45,358**
	Minimum Flow	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

* The managed hours are collected as 30 minutes and rounded up to an hour.
* Total hours of capability allocation plans that managed to mitigate congestion.
* "Congestion management for over capability" means the management implemented when the scheduled power flow reaches the maximum of available transfer capability of the interconnection line.
* "Congestion management for minimum flow" means the management implemented when the scheduled power flow goes below the minimum value of pass through the interconnection line.

(4) Annual Congestion Management of Cross-regional Interconnection Lines by Constraints for FY 2010–2017

Table 2-9 and Figure 2-10 show the annual congestion management of cross-regional interconnection lines by constraints for FY 2010–2017.

Table 2-9 Annual Congestion Management of Cross-regional Interconnection Lines by the Constraints (FY 2010–2017)

[h]

	Constraints	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	**Annual**
FY 2017	**Total**	2,210	3,758	2,789	2,985	2,682	2,851	3,024	4,433	5,188	5,263	4,519	5,659	**45,358**
	Over Capability	2,210	3,758	2,789	2,985	2,682	2,851	3,024	4,433	5,188	5,263	4,519	5,659	**45,358**
	Minimum Flow	0	0	0	0	0	0	0	0	0	0	0	0	**0**
FY 2016	Total	533	1,006	123	221	136	422	703	467	499	508	12	541	**5,167**
	Over Capability	533	1,006	123	221	136	422	703	467	499	508	12	541	**5,167**
	Minimum Flow	0	0	0	0	0	0	0	0	0	0	0	0	**0**
FY 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**
FY 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**
FY 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**
FY 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**
FY 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**
FY 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**

* The value in red is the annual maximum capability.
* The managed hours are collected as 30 minutes and rounded up to an hour.
* Total hours of capability allocation plans that managed to mitigate congestion.
* In-service dates of function for capability allocation plan revision of the Cross-regional Operation System are as below.
  1. The function for revision of weekly capability allocation plan and its congestion management: September, 2016
  2. The function for revision of monthly capability allocation plan and its congestion management: February, 2017

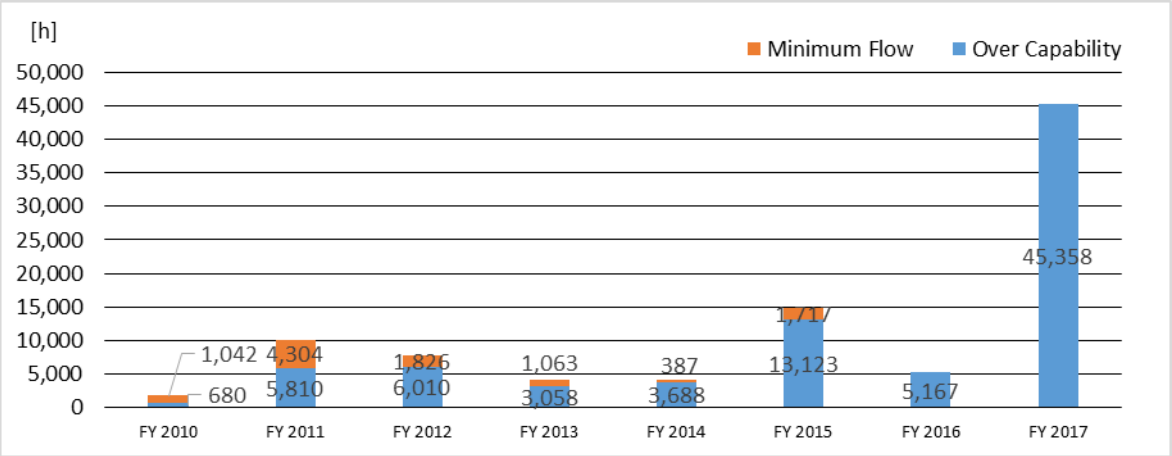


Figure 2-10: Annual Congestion Management of Cross-regional Interconnection Lines by Constraints (FY 2010–2017)

4. Status of Maintenance Work of Cross-regional Interconnection Lines

The following are details of the actual maintenance work of cross-regional interconnection lines as reported by the GT&D companies according to the provision of Article 167 of the Operational Rules.

(1) Actual Monthly Maintenance Work of Cross-regional Interconnection Lines in FY 2017

Table 2-10 shows the monthly maintenance work of cross-regional interconnection lines in FY 2017, and Figure 2-11 shows the nationwide monthly planned outage rate in FY 2017.

Table 2-10: Monthly Maintenance Work of Cross-regional Interconnection Lines (FY 2017)

Interconnection	Corresponding Facilities	Apr.		May		Jun.		Jul.		Aug.		Sep.		Oct.		Nov.		Dec.		Jan.		Feb.		Mar.		**Annual**	
		Nos.	Days	Nos.	Days	Nos.	Days	Nos.	Days	Nos.	Days	Nos.	Days	Nos.	Days	Nos.	Days	Nos.	Days	Nos.	Days	Nos.	Days	Nos.	Days	**Nos.**	**Days**
Hokkaido-Honshu	Hokkaido and Honshu AC/DC C.S.	4	2	9	5			4	4			4	3	30	18	2	1									**53**	**33**
Tohoku-Tokyo	Soma-Futaba bulk line							6	6			2	1					1	1							**9**	**8**
Tokyo-Chubu	Sakuma FC C.S.	2	2									1	1			2	10							1	1	**6**	**14**
	Shin Shinano FC C.S.			7	9			1	1					6	18	2	2	1	1	1	2					**18**	**33**
	Higashi Shimizu FC C.S.					1	1									9	14	5	16					1	1	**16**	**32**
Chubu-Kansai	Mie-Higashi Omi line																							2	2	**2**	**2**
Chubu-Hokuriku	Minami Fukumitsu HVDC BTB C.S.and Minami Fukumitsu Substation											7	14													**7**	**14**
Hokuriku-Kansai	Echizen-Reinan line	10	20	6	29	6	6									2	2							2	11	**26**	**68**
Kansai-Chugoku	Seiban-Higashi Okayama line, Yamazaki-Chizu line	5	18	1	29	2	5	1	4			18	19	4	2	15	6	2	1							**48**	**84**
Kansai-Shikoku	Kihoku and Anan AC/DC C.S.	16	25	15	24	7	7															2	2	13	22	**53**	**80**
Chugoku-Shikoku	Honshi interconnection line	7	15	10	14									1	1	1	1							1	9	**20**	**40**
Chugoku-Kyushu	Kanmon interconnection line			8	22	1	2																			**9**	**24**
Nationwide (Cumulative works for the same facilities deducted)		**44**	**82**	**56**	**132**	**17**	**21**	**12**	**15**	**0**	**0**	**32**	**38**	**41**	**39**	**33**	**36**	**9**	**19**	**1**	**2**	**2**	**2**	**20**	**46**	**267**	**432**

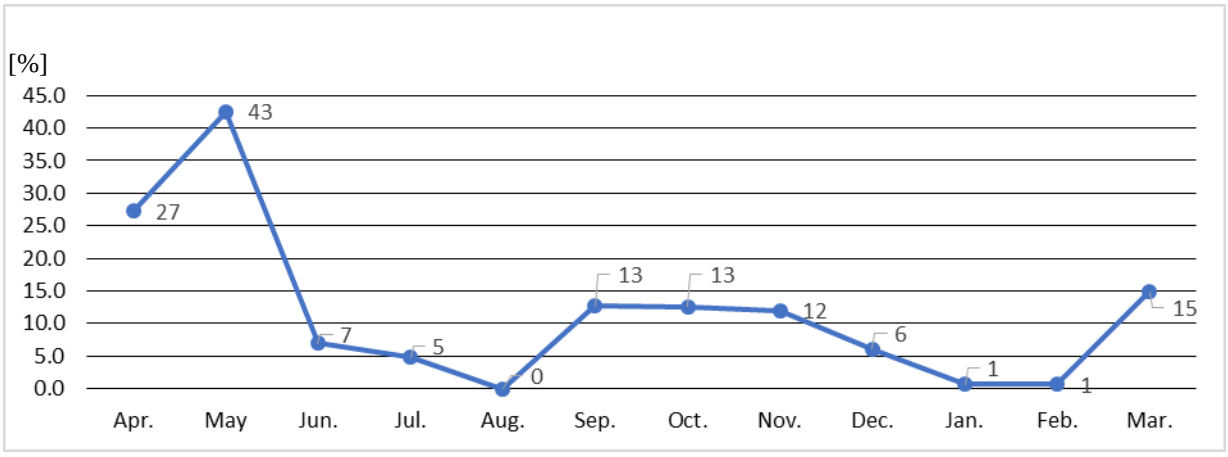


Figure 2-11: Nationwide Monthly Planned Outage Rate (FY 2017)

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

(2) Annual Maintenance Work for Cross-regional Interconnection Lines for FY 2010–2017

Table 2-11 shows the annual maintenance work of cross-regional interconnection lines for FY 2010–2017.

Table 2-11: Annual Maintenance Work of Cross-regional Interconnection Lines (FY 2010–2017)

	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY2016	FY 2017	Total	8-years Average
Number	64	56	58	38	63	91	218	267	855	107

* Significant increase from FY 2016 to 2017 is attributable to the introduction of Cross-regional Operation System which made detailed data management available.

5. Unplanned Outage of Cross-regional Interconnection Lines

(1) Unplanned Outage of Cross-regional Interconnection Lines in FY 2017

Table 2-12 shows the unplanned outage of cross-regional interconnection lines in FY 2017.

Table 2-12: Unplanned Outage of Cross-regional Interconnection Lines (FY 2017)

Date	Facility	Background
May 9	Hokkaido-Honshu HVDC Link	The converter station had maintenance work for replacing an information lock board. The information lock boad does not have device to collectively lock signals of maintenance work. The information lock has implemented as an ordinary condition; however, emergency stop signal has been sent and the station has tripped.
Jul. 14	Shin Shinano FC unit No.1 & 2	Secondary accident of network
Jul. 22	Shin Shinano FC unit No.2	Secondary accident of network

* The unplanned outage affecting TTC is described.

(2) Annual Unplanned Outage of Cross-regional Interconnection Lines for FY 2010–2017

Table 2-13 shows the annual unplanned outage of cross-regional interconnection lines for FY 2010–2017.

Table 2-13: Annual Unplanned Outage of Cross-regional Interconnection Lines (FY 2010–2017)

	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	Total	8-years Average
Numbers	9	5	6	9	1	3	3	3	39	5

6. Actual Utilization of Transmission Margin

The “utilization of transmission margin” describes the supply of electricity by GT&D companies utilizing part of their transmission margin when there is no ATC on the interconnection lines that applicants for capability allocation wish to use. There was no actual utilization of transmission margin in FY 2017 according to the provision of Article 151 of the Operational Rules.

7. Actual Employment of Transmission Margin

The “employment of transmission margin” describes the supply of electricity by GT&D companies employing their transmission margin to interconnection lines where the supply–demand balance is restricted or insufficient to reduce power supply, or other such possibilities. Table 2-14 shows the actual employment of transmission margin for FY 2017 according to the provision of Article 152 of the Operational Rules.

Table 2-14: Actual Employment of Transmission Margin (FY 2017)

Date	Facility	Background
Feb. 1	Interconnection Facilities between Tokyo and Chubu (Flow from Chubu to Tokyo)	Insufficient ATC of the corresponding facility in the regional service area of TEPCO PG which is subject to the instruction of power exchanges because of demand growth due to the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plant.
Feb. 2	Interconnection Facilities between Tokyo and Chubu (Flow from Chubu to Tokyo)	Insufficient ATC of the corresponding facility in the regional service area of TEPCO PG which is subject to the instruction of power exchanges because of demand growth due to the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plant.
Feb. 22	Interconnection Facilities between Tokyo and Chubu (Flow from Chubu to Tokyo)	Insufficient ATC of the corresponding facility in the regional service area of TEPCO PG which is subject to the instruction of power exchanges because of demand growth due to the intensive cold air, and the possible decrease of energy output from pumped storage hydro power plant.

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

The actual available transfer capabilities (ATC) calculated and published according to Article 133 of the Operational Rules are shown in the following pages.

- How to read the graphs of actual ATC

  Interconnection line is utilized according to the procedures described in 1(2) of Chapter II.

  [(i) Calculation of TTC]→[(ii) Calculation of Margin]→[(iii) Registration of SPF]→[(iv) Calculation of ATC]

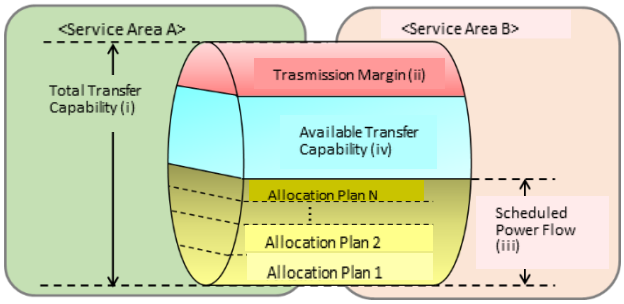


Figure 2-12: Concept of Utilization of Cross-regional Interconnection Lines

Graphs for the actual ATC of each interconnection line for FY 2017 are presented in the following pages based on the above concept. How to read the ATC graph is described below according to procedures (i) to (iv).

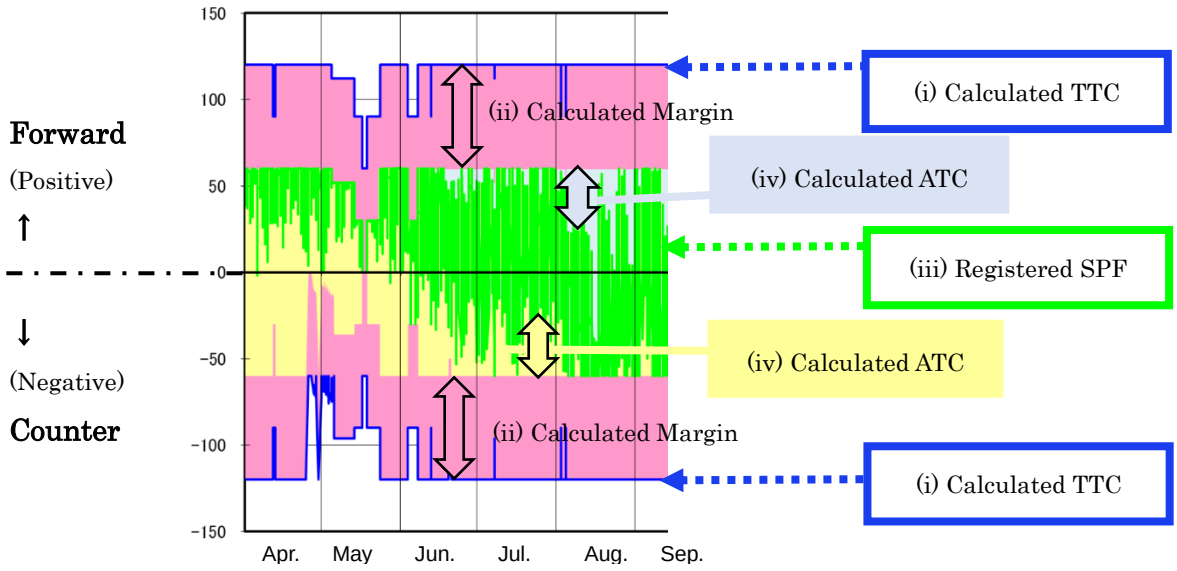


Figure 2-13: How to Read the Graphs of the Actual ATC

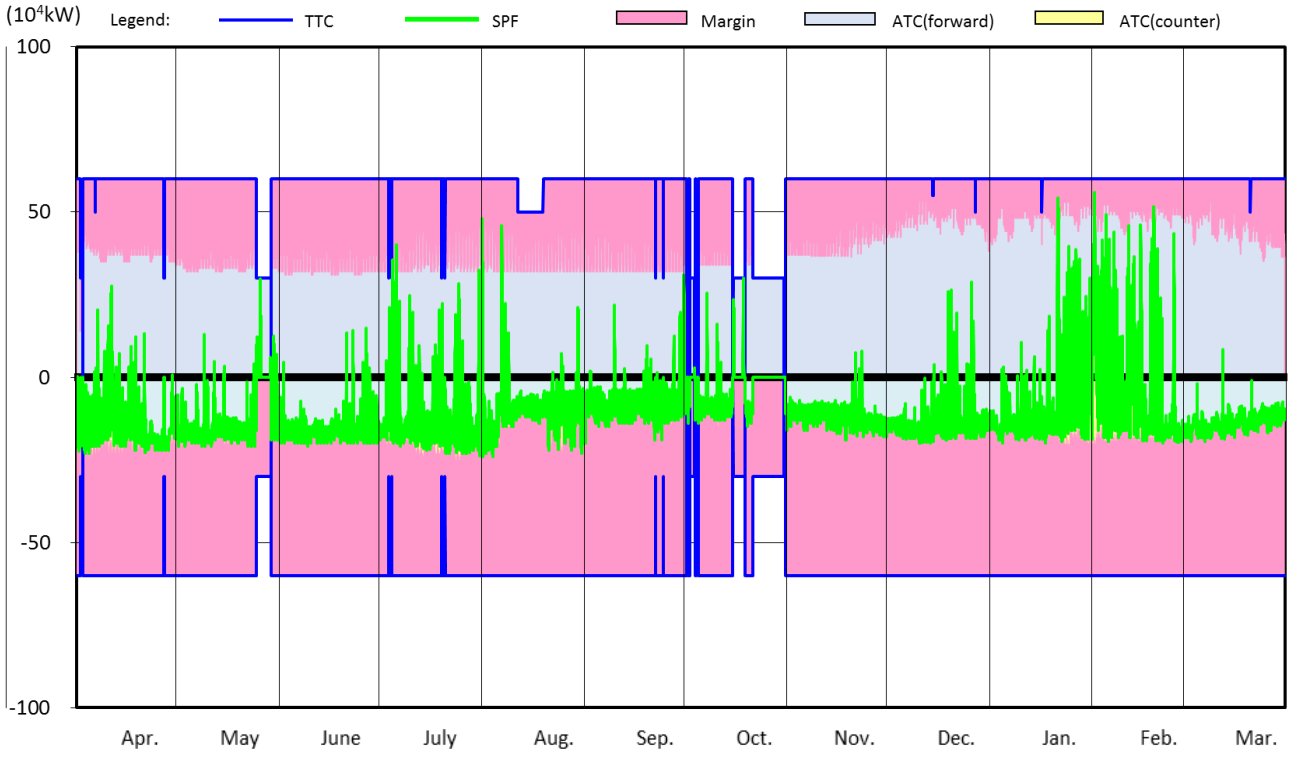
*The actual flows on the transmission lines are offset in each direction. Therefore, the scheduled power flow is the offset figure between forward and counter flows, not the simple addition of each direction. In addition, offset figures on the graphs are observed as SPF, not observing the capacity of each forward and counter flow, respectively.

(Reference) Publishing actual ATC

Detailed network system information including actual ATC is available at the URL below.

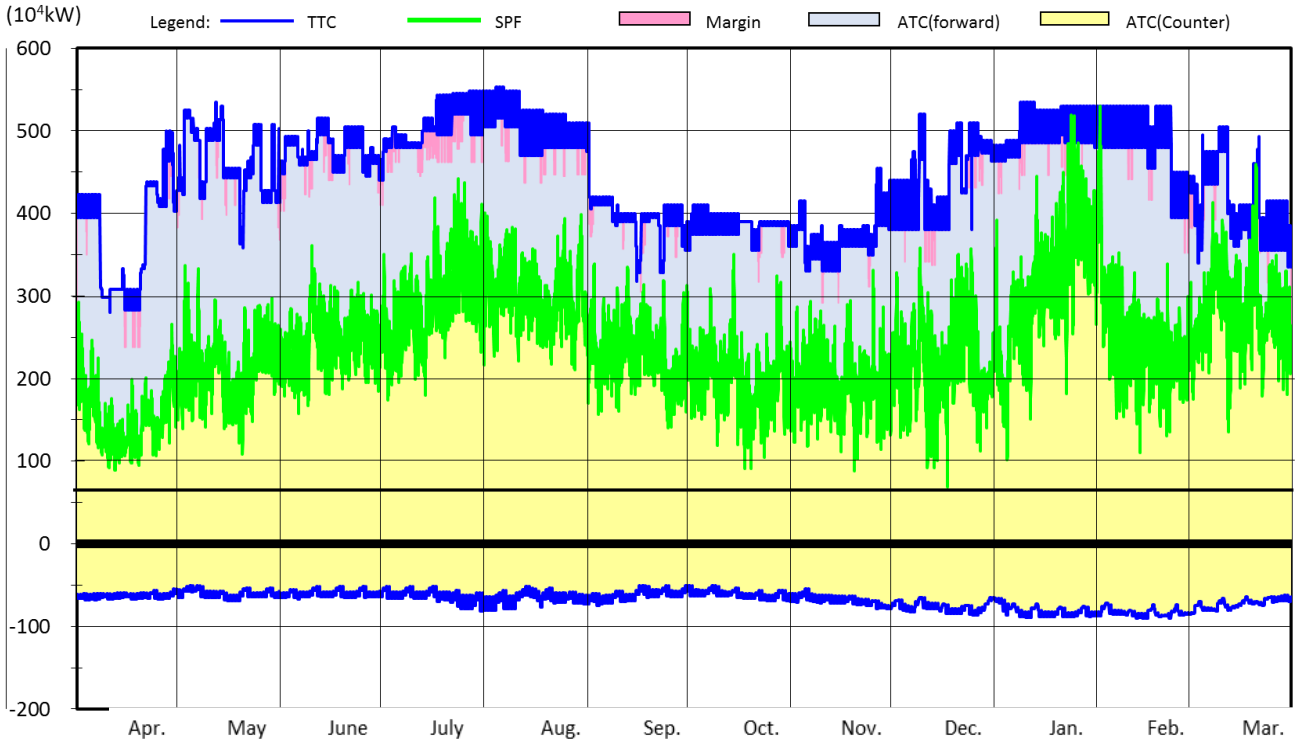
URL http://occtonet.occto.or.jp/public/dfw/RP11/OCCTO/SD/LOGIN_login#

Figure 2-14: Actual ATC of Interconnection Facilities between Hokkaido and Honshu (FY 2017)
(Hokkaido and Honshu HVDC Link)



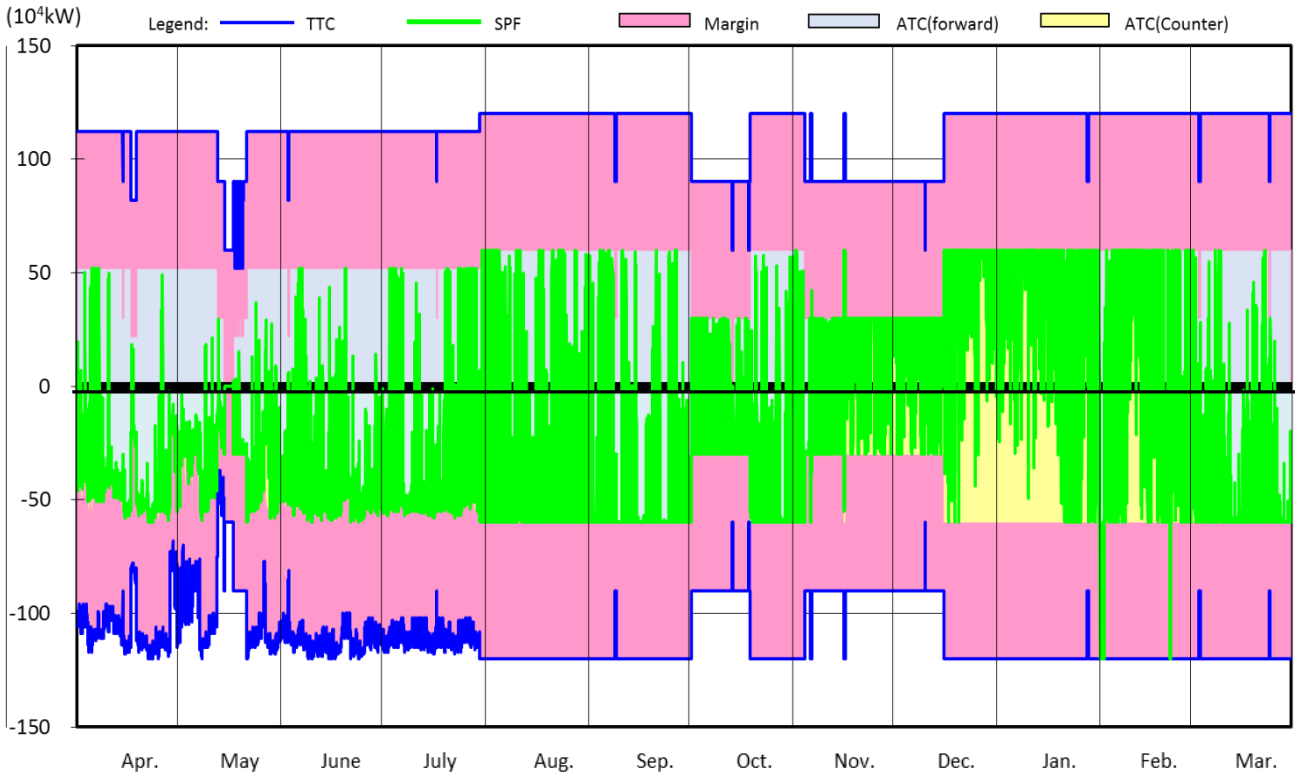
Note: Hokkaido to Tohoku as forward (positive) flow, Tohoku to Hokkaido as counter (negative) flow.

Figure 2-15: Actual ATC of Interconnection Line between Tohoku and Tokyo (FY 2017) (Soma-Futaba Bulk Line)



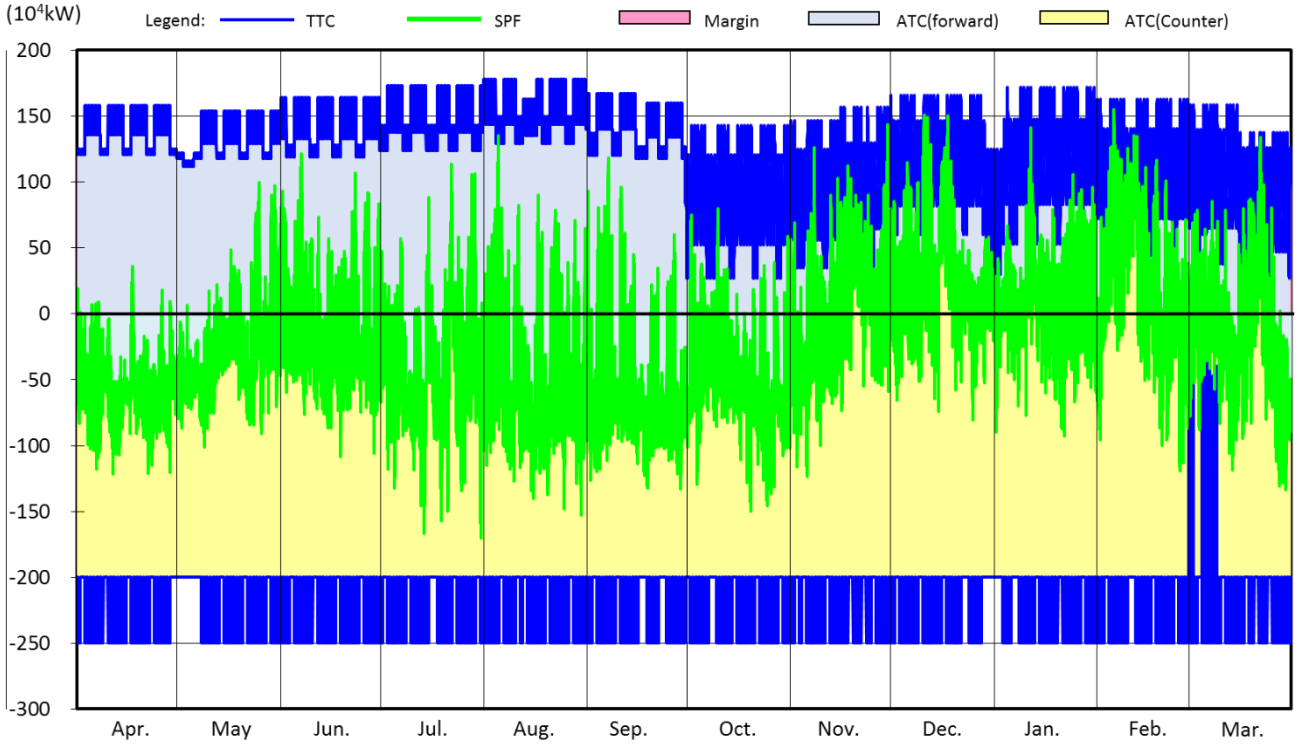
Note: Tohoku to Tokyo as forward (positive) flow, Tokyo to Tohoku as counter (negative) flow.

Figure 2-16: Actual ATC of Interconnection Facilities between Tokyo and Chubu (FY 2017)
(Sakuma, Shin-Shinano & Higashi Shimizu F.C.)



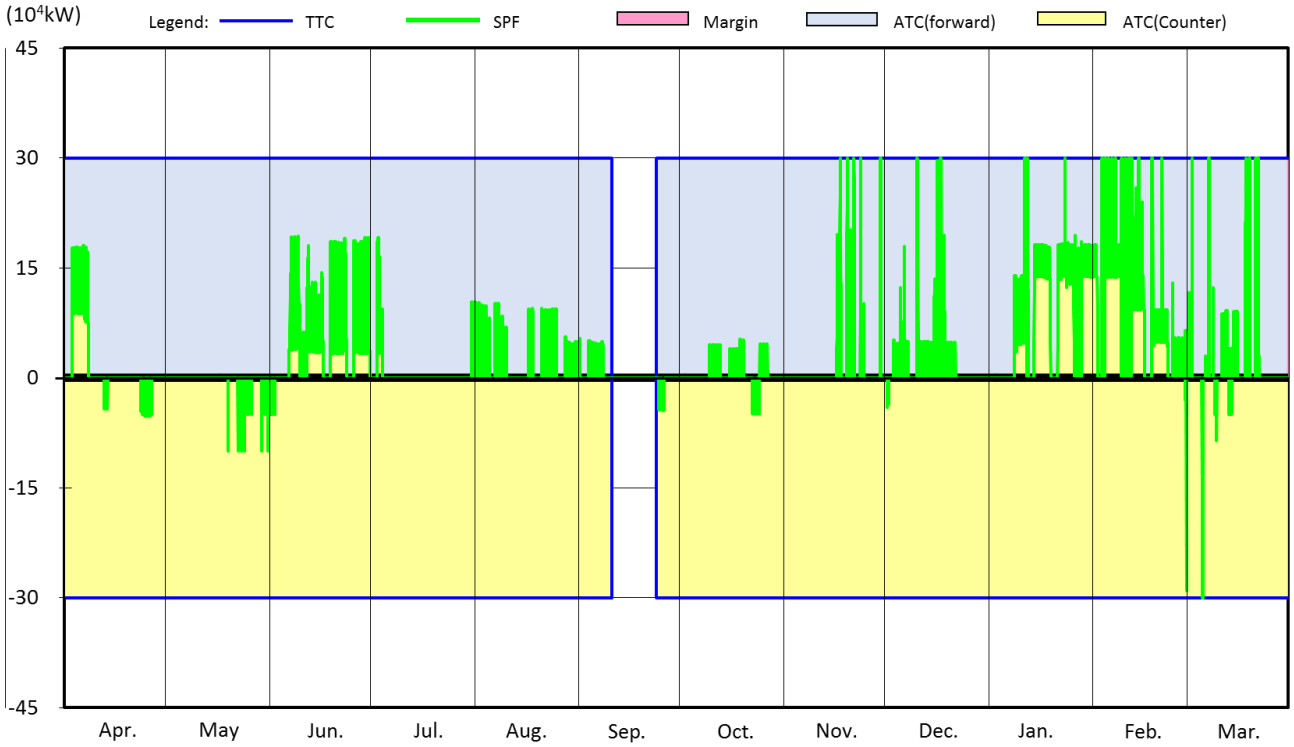
Note: Tokyo to Chubu as forward (positive) flow, Chubu to Tokyo as counter (negative) flow.

Figure 2-17: Actual ATC of Interconnection Line between Chubu and Kansai (FY 2017) (Mie-Higashi Omi Line)



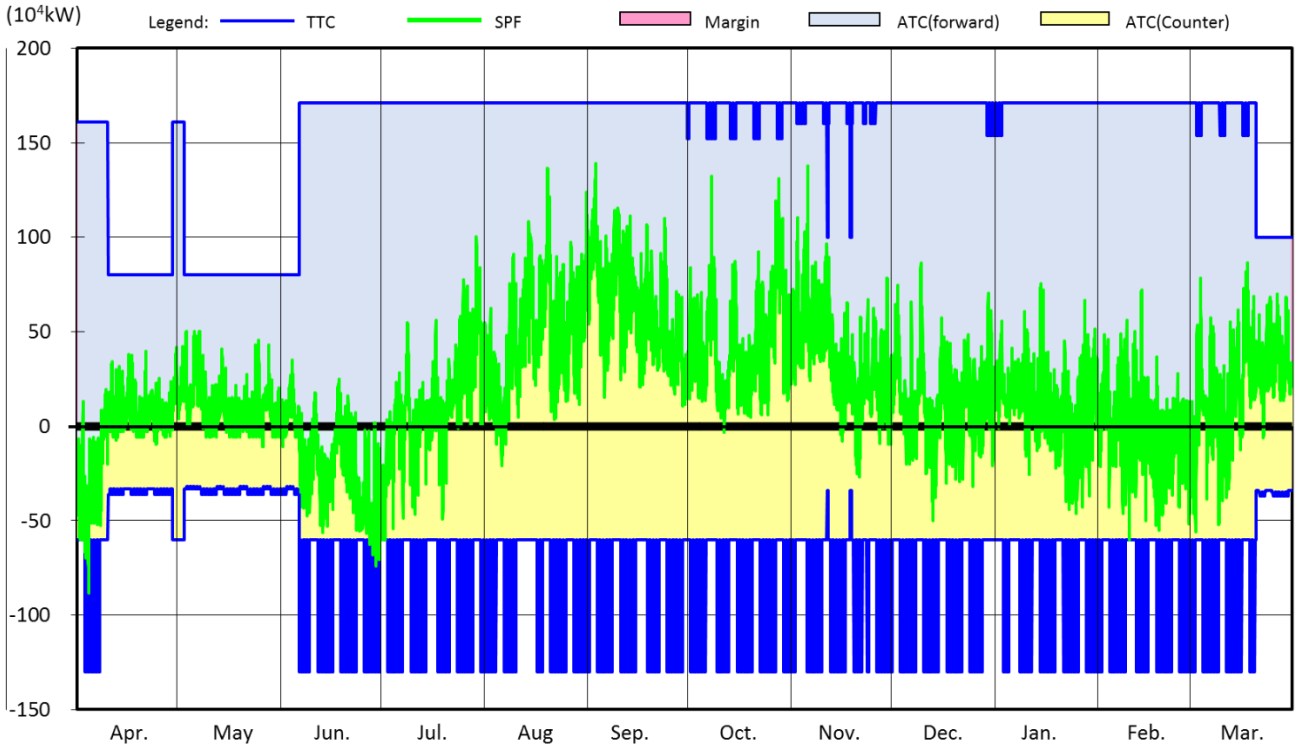
Note: Chubu to Kansai as forward (positive) flow, Kansai to Chubu as counter (negative) flow.

Figure 2-18: Actual ATC of Interconnection Facilities between Chubu and Hokuriku (FY 2017)
(Minami Fukumitsu HVDC BTB C.S. and Minami Fukumitsu Substation)



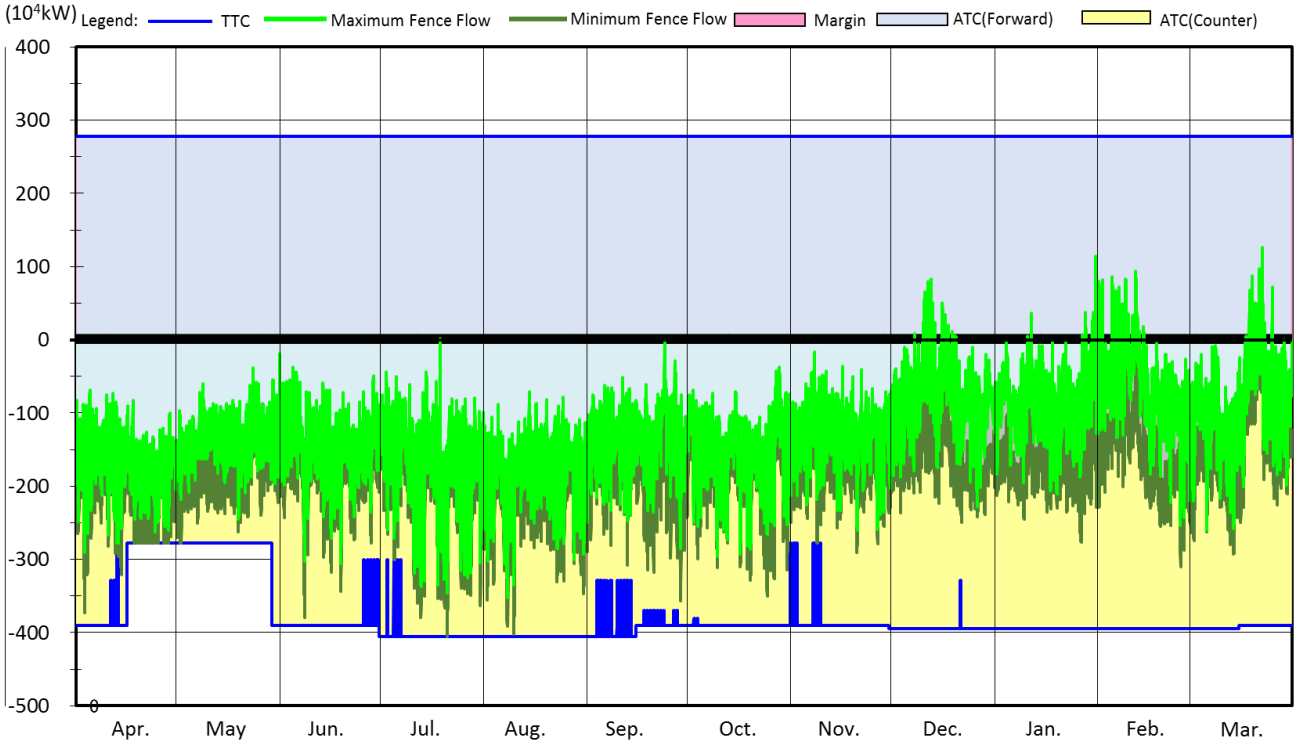
Note: Chubu to Hokuriku as forward (positive) flow, Hokuriku to Chubu as counter (negative) flow.

Figure 2-19: Actual ATC of Interconnection Line between Hokuriku and Kansai (FY 2017) (Echizen-Reinan Line)



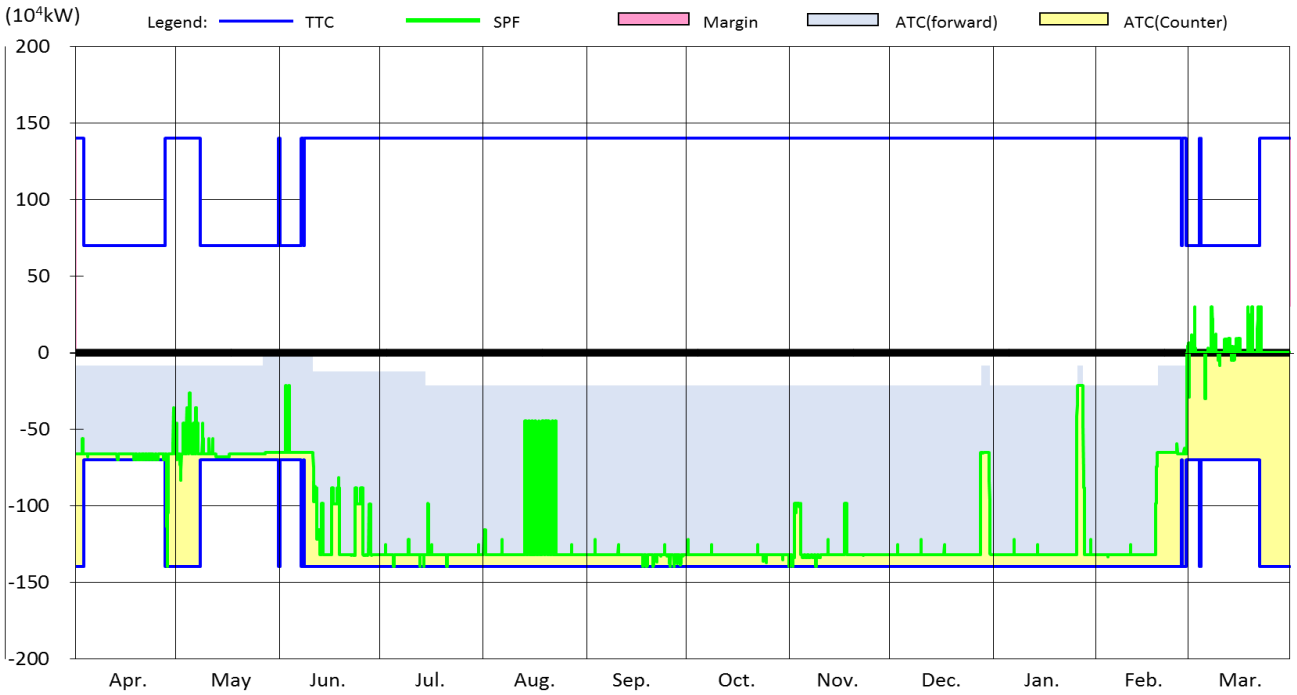
Note: Hokuriku to Kansai as forward (positive) flow, Kansai to Hokuriku as counter (negative) flow.

Figure 2-20: Actual ATC of Interconnection Lines between Kansai and Chugoku (FY 2017)
(Seiban-Higashi Okayama Line, Yamazaki-Chizu Line)



Note: Kansai to Chugoku as forward (positive) flow, Chugoku to Kansai as counter (negative) flow.

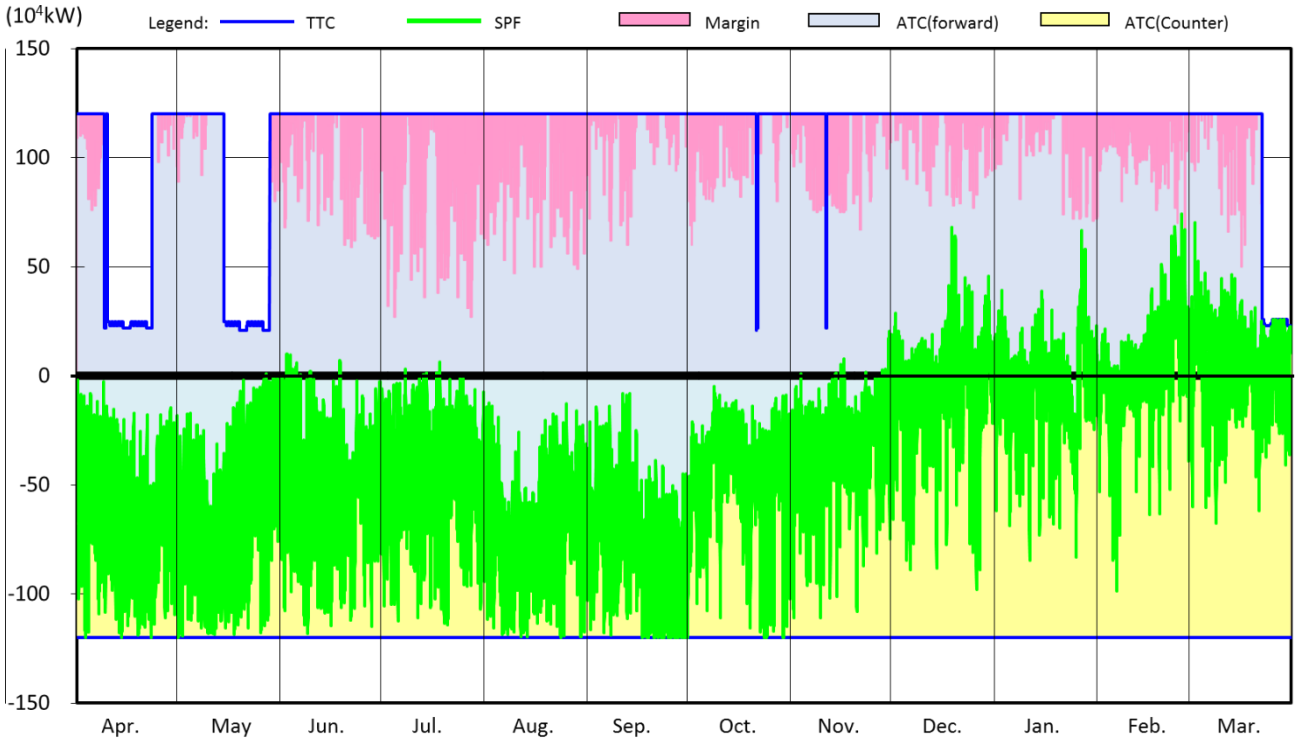
Figure 2-21: Actual ATC of Interconnection Facilities between Kansai and Shikoku (FY 2017)
(Interconnection facilities between Kihoku and Anan AC/DC C.S.)



Note: Kansai to Shikoku as forward (positive) flow, Shikoku to Kansai as counter (negative) flow.

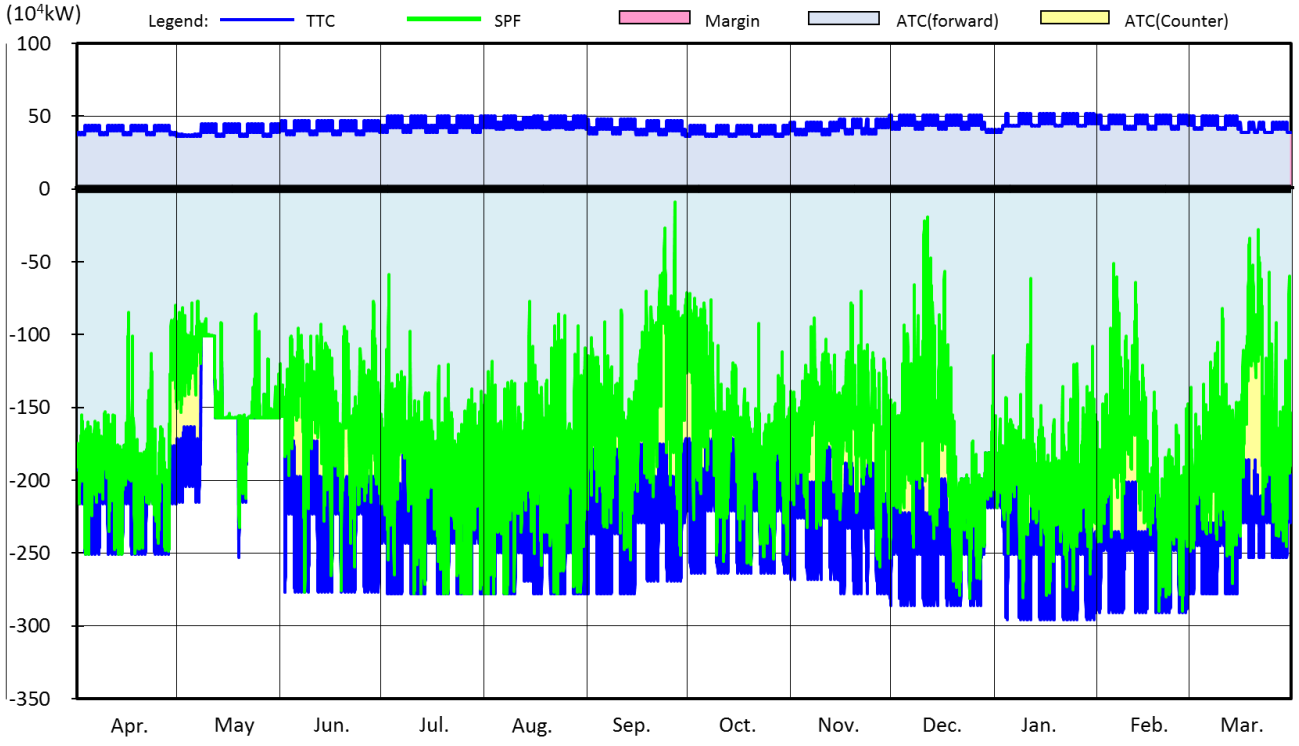
* ATC on forward flow is calculated and chosen from the smaller of those listed below.
・TTC － transfer margin － SPF
・TTC of Minami Awa Bulk Line － (Supply Capacity of Tachibanawan Thermal Power Station － SPF of Anan-Kihoku DC Bulk Line)

Figure 2-22: Actual ATC of Interconnection Line between Chugoku and Shikoku (FY 2017)
(Honshi Interconnection Line)



Note: Chugoku to Shikoku as forward (positive) flow, Shikoku to Chugoku as counter (negative) flow.

Figure 2-23: Actual ATC of Interconnection Line between Chugoku and Kyushu (FY 2017)
(Kanmon Interconnection Line)



Note: Chugoku to Kyushu as forward (positive) flow, Kyushu to Chugoku as counter (negative) flow.

9. Actual Constraints on Cross-regional Interconnection Lines Nationwide

Figure 2-24 shows the actual constraints on cross-regional interconnection lines nationwide. The constraint data are published at the end of May, reported to the Organization by GT&D companies, and compiled into a nationwide map by the Organization. Constraints on the subordinate lines are not shown in the map.

* The map on the following page is prepared from the data posted on the websites below (in Japanese only).
Hokkaido Electric Power Company : http://www.hepco.co.jp/corporate/con_service/bid_info.html
Tohoku Electric Power Company : http://www.tohoku-epco.co.jp/jiyuka/04.htm
Tokyo Electric Power Company : http://www.tepco.co.jp/pg/consignment/system/index-j.html
Chubu Electric Power Company : http://www.chuden.co.jp/corporate/study/free/rule/map/index.html
Hokuriku Electric Power Company : http://www.rikuden.co.jp/rule/U_154seiyaku.html
The Kansai Electric Power Company : http://www.kepco.co.jp/corporate/takusou/disclosure/ryutusetsubi.html
The Chugoku Electric Power Company : http://www.energia.co.jp/retailer/keitou/access.html
Shikoku Electric Power Company : http://www.yonden.co.jp/business/jiyuuka/tender/index.html
Kyushu Electric Power Company : http://www.kyuden.co.jp/wheeling_disclosure
The Okinawa Electric Power Company : http://www.okiden.co.jp/business-support/service/rule/plan/index.html

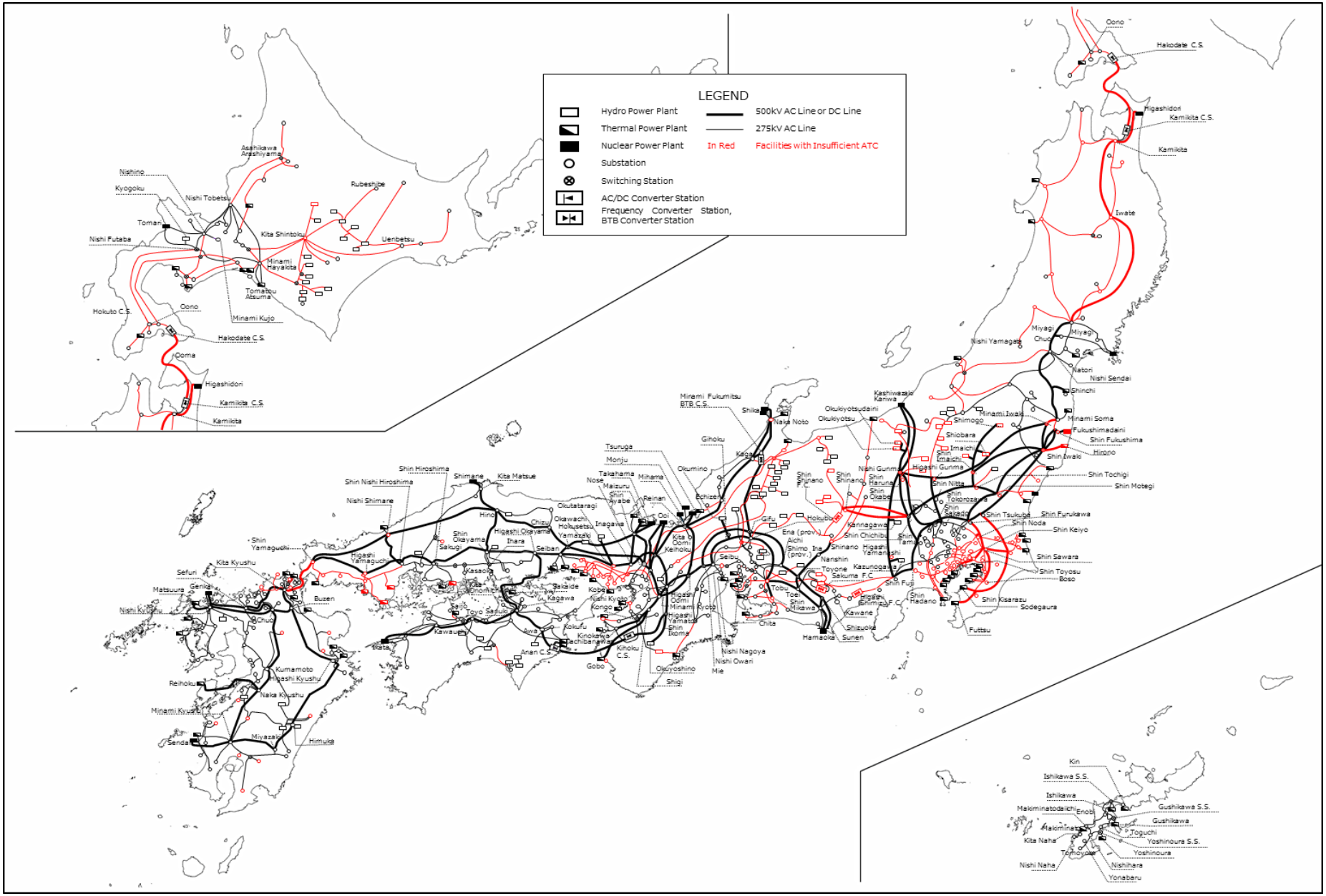


Figure 2-24: Actual Constraints on Cross-regional Interconnection Lines Nationwide (prepared from data provided by GT&D companies published at the end of May, 2018)

CONCLUSION

Actual Electricity Supply–Demand

For actual electricity supply–demand, data for peak demand, electric energy requirement, load factor, supply–demand status during the peak demand period, and the bottom demand period, and peak daily energy supply are collected. In addition, instructions of power exchange according to the provisions of paragraph 1 of Article 28-44 of the Electricity Business Act, and actual output shedding of renewable energy-generating facilities according to the provision of the 'Ministerial Ordinance of Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources by Electric Utilities' are aggregated.

Actual Utilization of Cross-regional Interconnection Lines

For actual utilization of cross-regional interconnection lines, data for utilization, congestion management, maintenance work, unplanned outage, utilization and employment of transmission margin, and available transfer capability are collected. In addition, the Organization compiles the actual constraints on cross-regional interconnection lines into a nationwide constraint map based on the data of available transfer capability map published by GT&D companies

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