Basic Technical Specifications for Tokyo-Chubu HVDC Interconnection Project ［General Technical Specifications］

Note）The terms of this [General Technical Specifications] are subject to change according to the further study in future.

Basic technical specifications for the Tokyo-Chubu HVDC Interconnection Project (expected to be brought into operation in FY 2020) are as follows at this point.

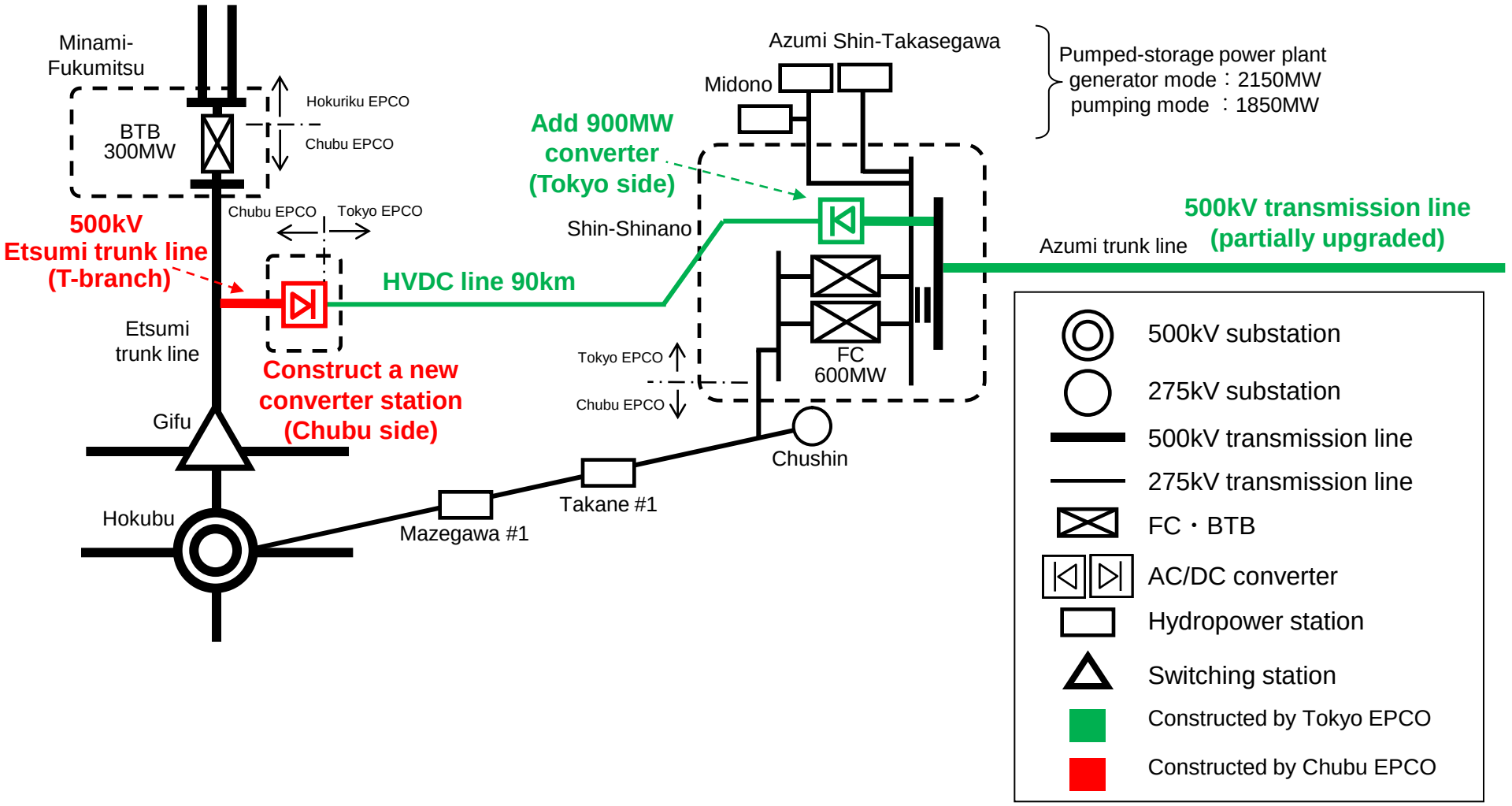
- AC/DC conversion：Line-commutated type
- Rated capacity：900MW (450MW 2units)
- DC voltage：±200kV
- Frequency：(Tokyo side) 50Hz / (Chubu side) 60Hz
- Telecommunication：Microwave link×2route

Tokyo Electric Power Co., Inc.
Chubu Electric Power Co., Inc.

1. Outline of Tokyo-Chubu HVDC Interconnection Project

【Increase power interchange capacity between 50Hz/60Hz areas by 900MW】

➢ Install HVDC interconnection 900MW to be brought into operation in FY 2020.

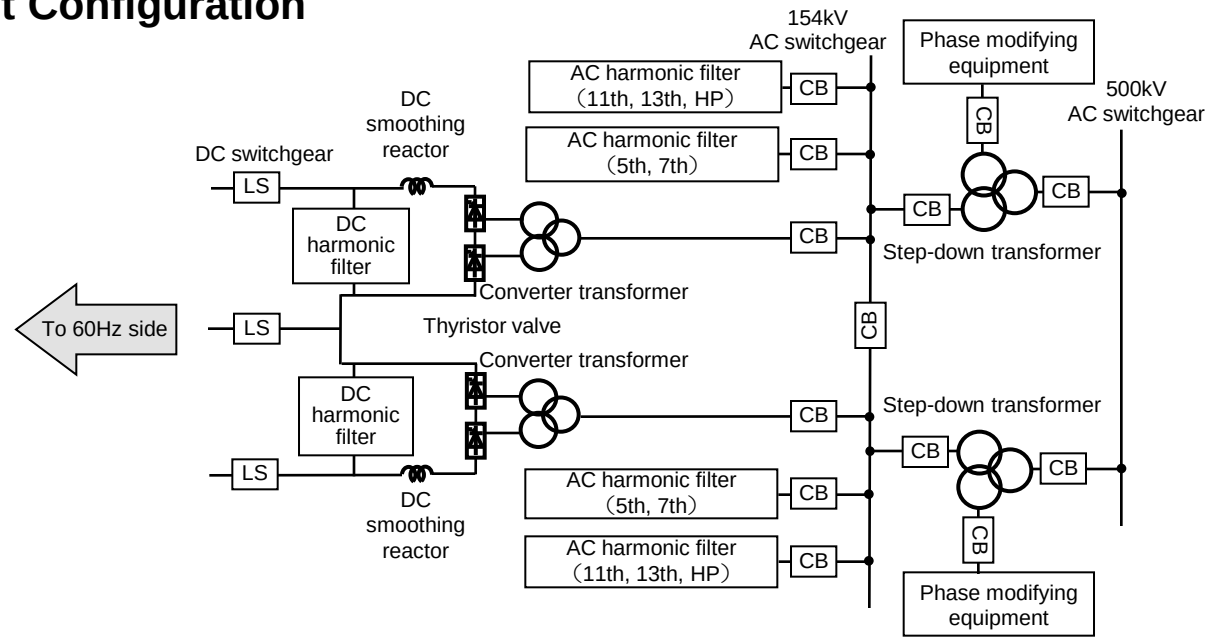


2-1. Equipment（at Tokyo EPCO's Shin-Shinano substation）

◇ List of Equipment

	Name of equipment	Quantity
AC/DC converter equipment	・Thyristor valve	450MW 2units
	・Converter transformer	560MVA,154kV/87kV 2units
	・DC smoothing reactor	1H 2units
	・AC harmonic filter	5th･7th 2banks,11th･13th･HP 2banks
	・DC harmonic filter	12th(HP) 2banks
	・Phase modifying equipment	Leading 300Mvar，Lagging 300MVar
	・DC switchgear	1set
AC equipment	・Step-down transformer	500MVA,500kV/154kV/66kV 2units
	・500kV･154kV･66kV AC switchgear	500kV 2bays,154kV 9bays,66kV 2bays

◇ Circuit Configuration

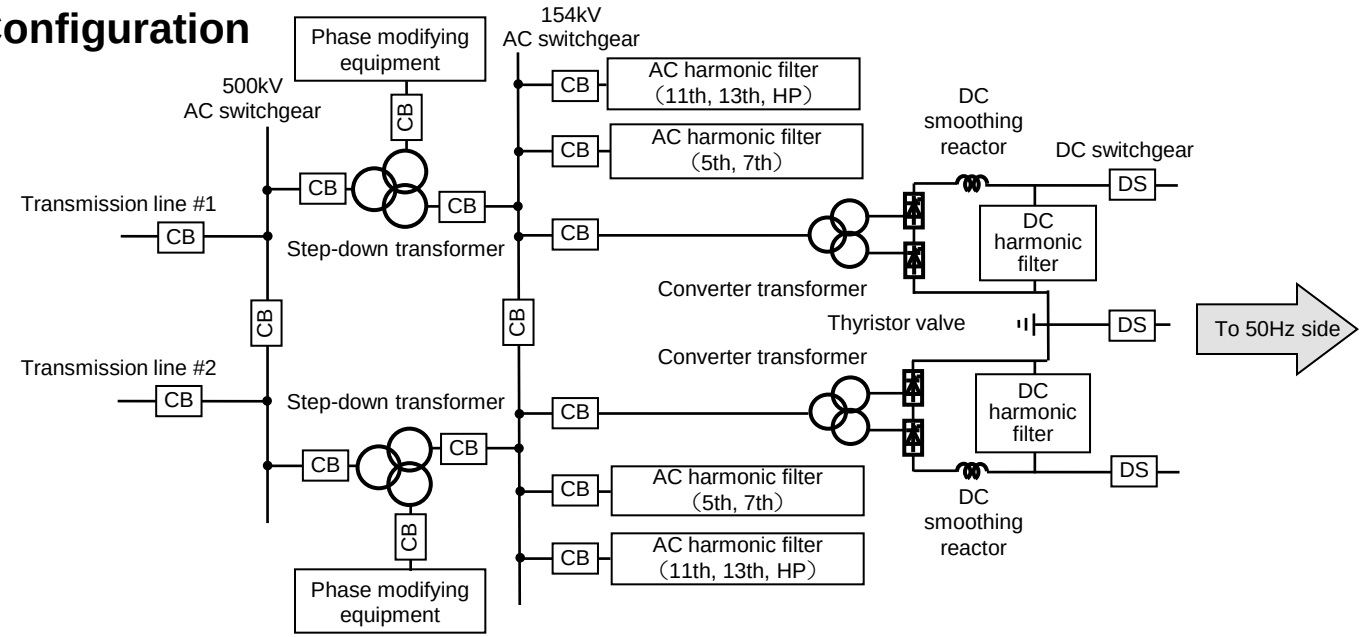


2-2. Equipment（at Chubu EPCO's new converter station）

◇ List of Equipment

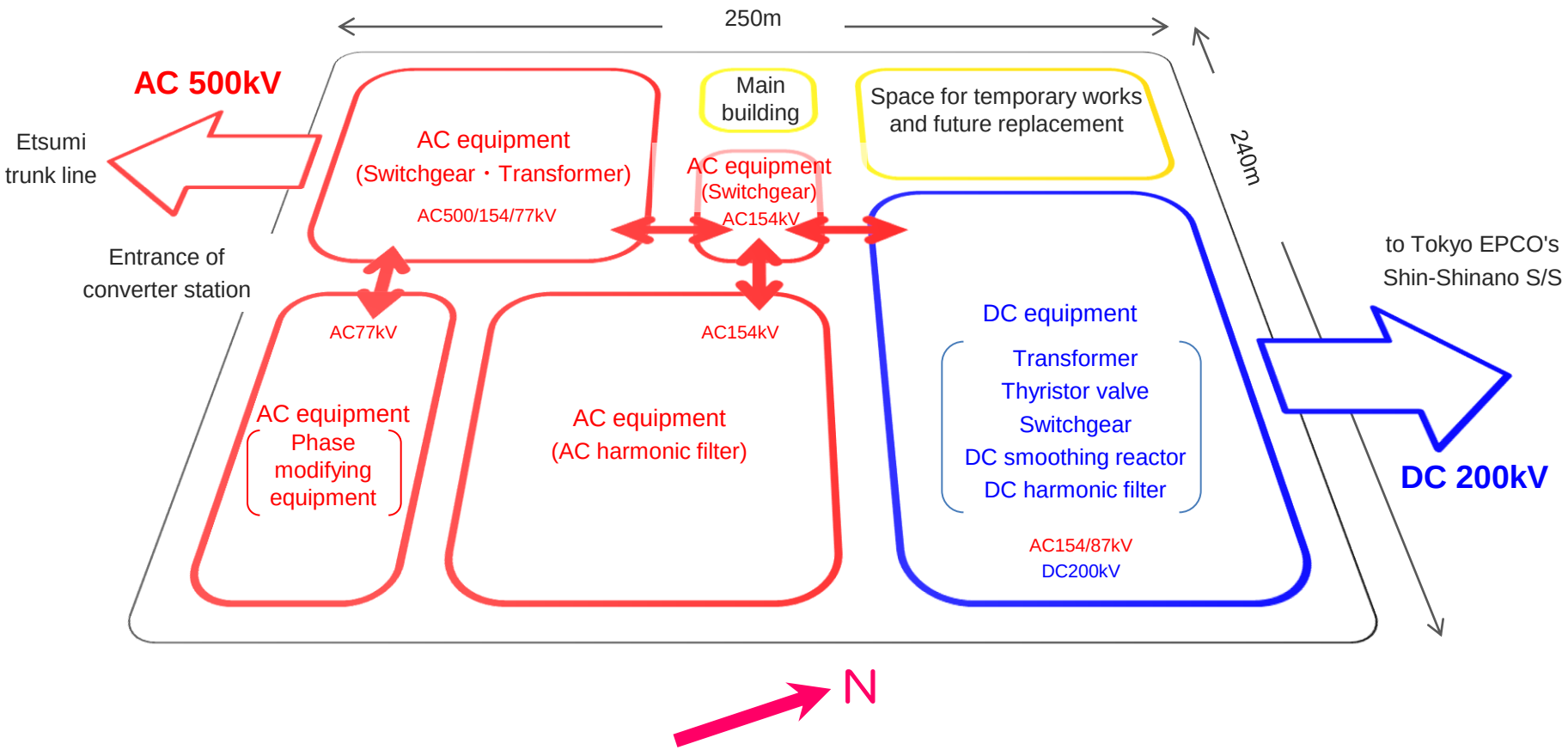
	Name of equipment	Quantity
AC/DC converter equipment	・Thyristor valve	450MW 2units
	・Converter transformer	560MVA, 154kV/87kV 2units
	・DC smoothing reactor	1H 2units
	・AC harmonic filter	5th･7th 2banks, 11th･13th･HP 2banks
	・DC harmonic filter	12th(HP) 2banks
	・Phase modifying equipment	SC 60MVA 6banks，ShR 80MVA 4units
	・DC switchgear	1set
AC equipment	・Step-down transformer	500MVA, 500kV/154kV/77kV 2units
	・500kV･154kV･77kV AC switchgear	500kV 5bays, 154kV 9bays, 77kV 2bays

◇ Circuit Configuration



3-1. Tentative Layout（of Tokyo EPCO's Shin-Shinano substation）

3-2. Tentative Layout（of Chubu EPCO's new converter station）



4-1. Scope of Work （for Tokyo EPCO's Shin-Shinano substation）

◎At this stage we haven't decided how to combine and order the items.

Item			Specification
AC/DC converter	System design	Rated capacity	900MW(450MW 2units)
		Rated voltage／Rated current	±200kV／2250A
		Frequency	50Hz
		Control method	12 phase collective control
		Target availability	More than 97% at equivalent bipolar outage time※
	Thyristor valve	Insulation	Indoor air insulated
		Rated voltage／Rated current	200kV／2250A
Converter transformer		Capacity	560MVA（280MVA 2stages）
		Rated voltage	154kV／87kV
		Connection	Y-Y, Y-D
DC smoothing reactor		Inductance	1H
		Rated voltage／Rated current	200kV／2250A
AC harmonic filter		Rated voltage	154kV
		Branch configuration	5th,7th,11th,13th,HP

Item		Specification
DC harmonic filter	Rated voltage	200kV
	Branch configuration	12th（HP）
Phase modifying equipment	Leading Capacity	300MVar
	Lagging Capacity	300MVar
DC switchgear	Insulation	(outdoor) air insulated
	Rated voltage	200kV
Step-down transformer	Capacity	500MVA
	Rated voltage	500kV/154kV/66kV
	Connection	Y-Y-D
AC switchgear（500kV）	Insulation	SF_6 gas insulated
AC switchgear（154kV）	Insulation	SF_6 gas insulated
AC switchgear（66kV）	Insulation	SF_6 gas insulated

※Note）Equivalent bipolar outage time：Interrupted capacity and outage time are converted to equivalent outage time for bipolar capacity
(ex. Monopole 450MW×2days ⇒ Bipolar 900MW×1day)

4-2. Scope of Work （for Chubu EPCO's new converter station）

◎At this stage we haven't decided how to combine and order the items.

Item			Specification
AC/DC converter	System design	Rated capacity	900MW(450MW 2units)
		Rated voltage／Rated current	±200kV／2250A
		Frequency	60Hz
		Control method	12 phase collective control
		Target availability	More than 97% at equivalent bipolar outage time※
	Thyristor valve	Insulation	Indoor air insulated
		Rated voltage／Rated current	200kV／2250A
Converter transformer		Capacity	560MVA（280MVA 2stages）
		Rated voltage	154kV／87kV
		Connection	Y-Y, Y-D
DC smoothing reactor		Inductance	1H
		Rated voltage／Rated current	200kV／2250A
AC harmonic filter		Rated voltage	154kV
		Branch configuration	5th,7th,11th,13th,HP

Item		Specification
DC harmonic filter	Rated voltage	200kV
	Branch configuration	12th（HP）
Phase modifying equipment（77kVSC）	Capacity	60MVA 6banks
Phase modifying equipment（77kVShR）	Capacity	80MVA 4units
DC switchgear	Insulation	SF_6 gas insulated
	Rated voltage	200kV
Step-down transformer	Capacity	500MVA
	Rated voltage	500kV/154kV/77kV
	Connection	Y-Y-D
AC switchgear（500kV）	Insulation	SF_6 gas insulated
AC switchgear（154kV）	Insulation	SF_6 gas insulated
AC switchgear（77kV）	Insulation	SF_6 gas insulated

※Note）Equivalent bipolar outage time：Interrupted capacity and outage time are converted to equivalent outage time for bipolar capacity (ex. Monopole 450MW×2days ⇒ Bipolar 900MW×1day)