Mapping Capacity of Local Industry to Support NPP Project in Indonesia: Current Status

Arie Rahmadi-BPPT

25 Februari 2020

OUTLINE

1. Background

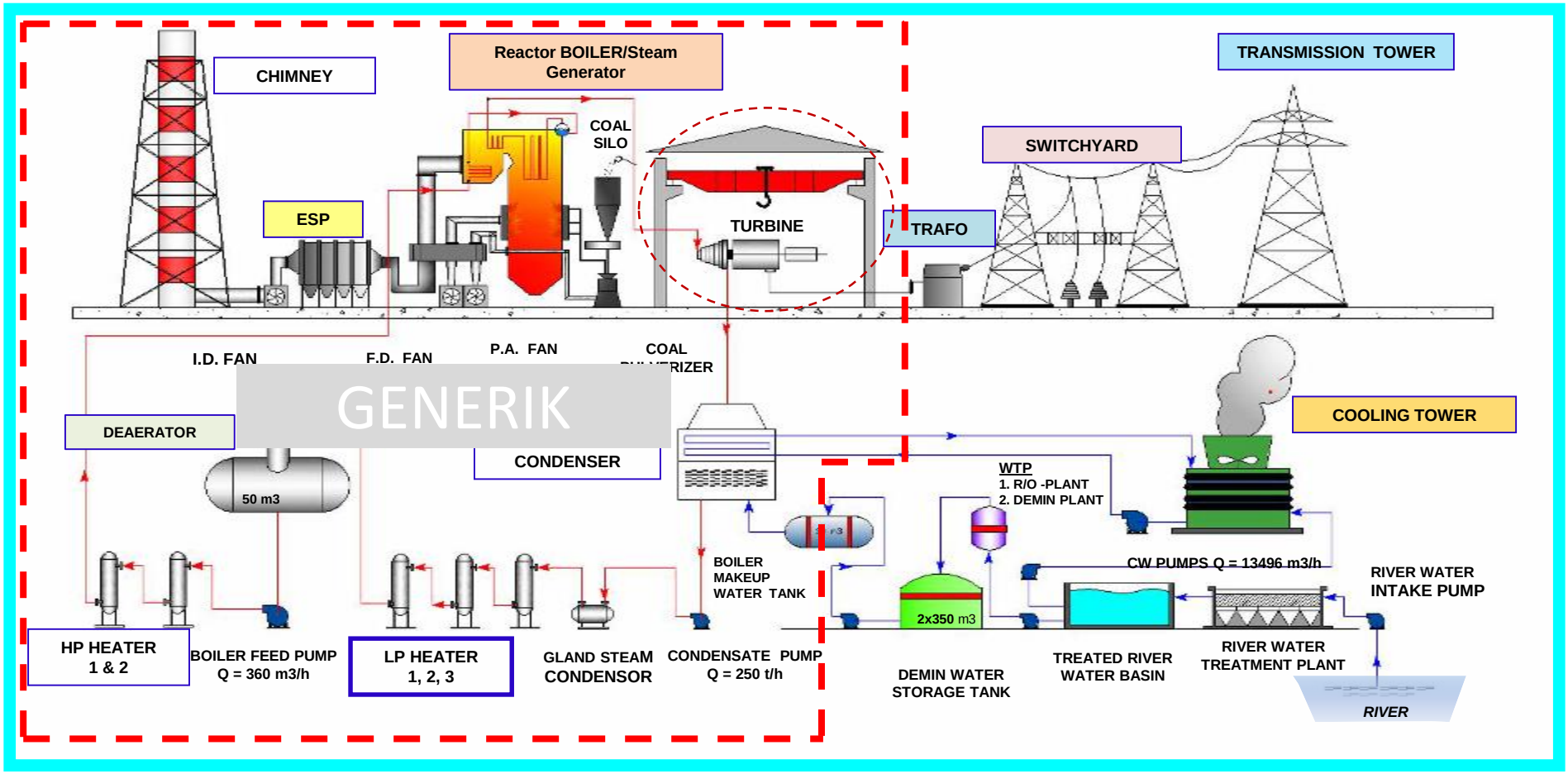
3. Future Work

2. Current Mapping resuts

1.0 Background

- Mapping for Indonesian Industrial capacity to support Electricty project has been carried out since the inception of 35.000 MW in 2014
- Improving local content is viewed as realistic effort to reduce our import and providing employment opportunities
- Business Plan PT PLN has shown that More Power Plant under 100 MW will be built.
- Private firm through IPP will play major role

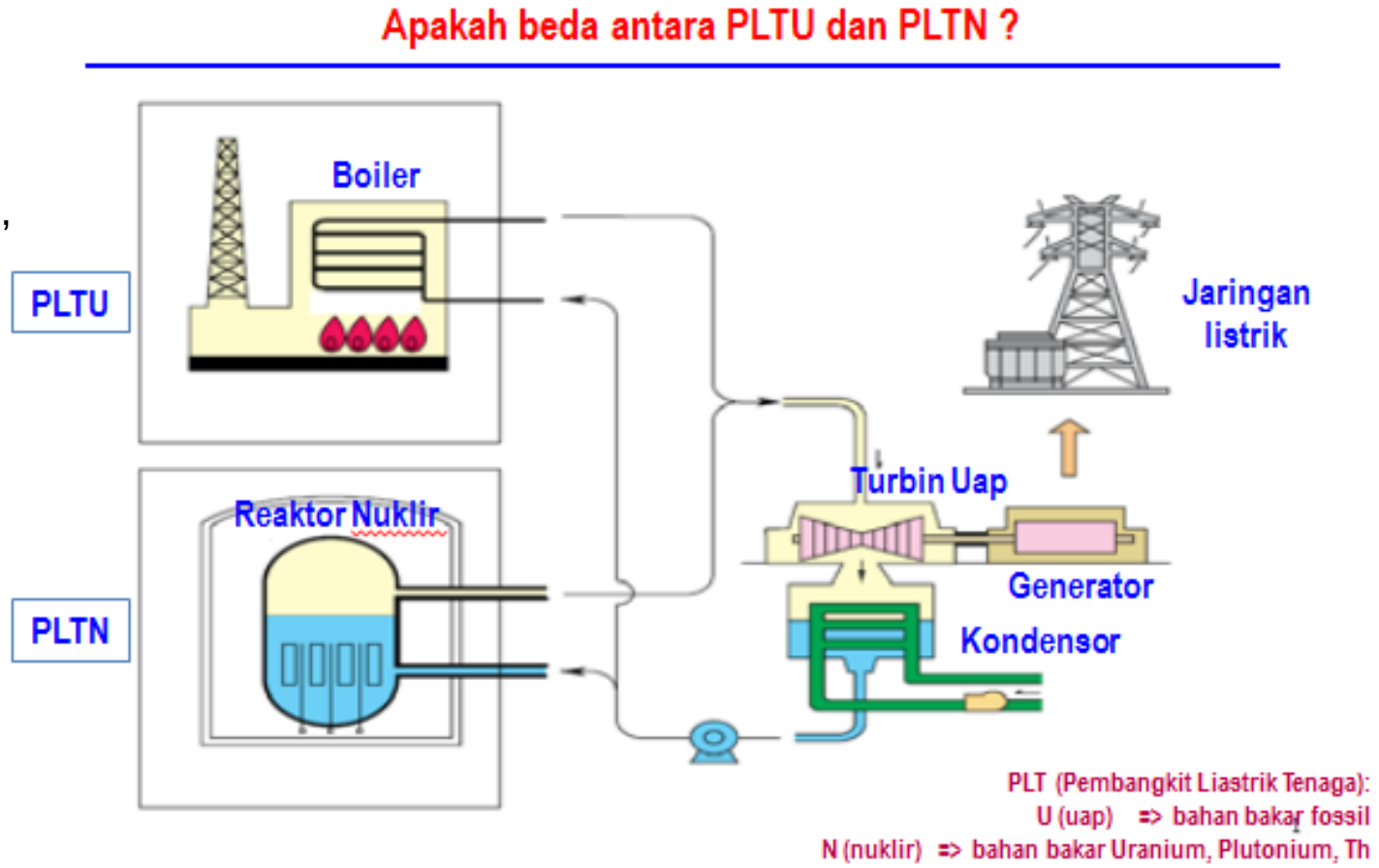
General Schematic Thermal Power Plant



Nuclear Power plant as a solution

The Advent of SMR, Nuclear Power Plant may compete with other based load power plants

Available Technologies:
Hitachi GE, NuScale, ACP 100, Thorcon etc



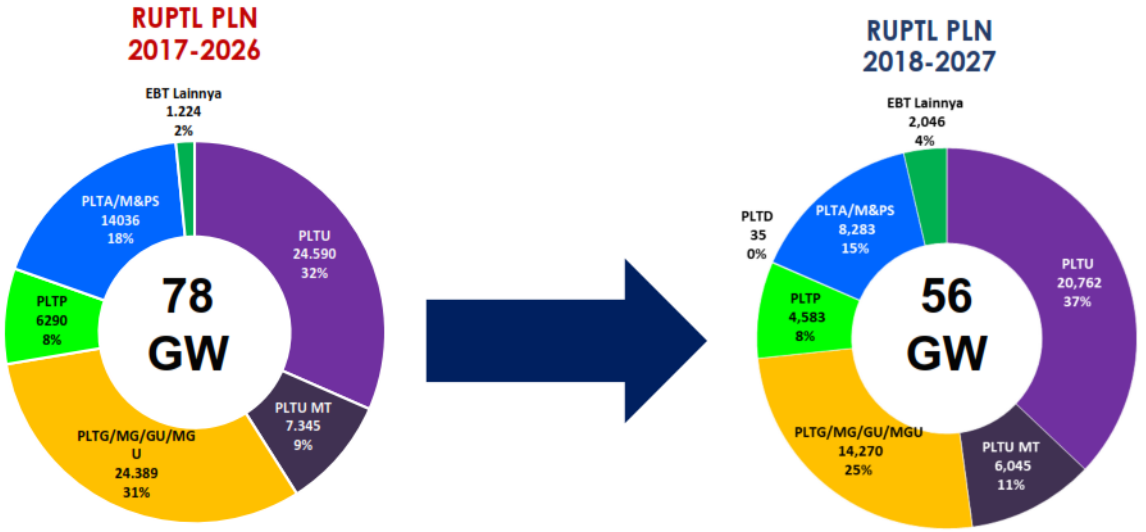
Capacity per Unit Size RUPTL 2016-2025

Number of Unit per capacity classs

PLT lain : PLTBM, PLTB, PLTS, PLTSa **Unit**

Kapasitas	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
PLTU	32	37	35	61	28	12	5	6	4	4	224
PLTP	2	5	6	13	10	8	6	18	29	31	128
PLTGU	0	8	22	4	0	0	5	2	10	5	56
PLTG/MG	13	51	33	12	15	9	6	3	1	2	145
PLTD	0	0	0	0	0	0	0	0	0	0	0
PLTM	10	18	20	78	19	17	40	6	60	39	307
PLTA	1	2	7	12	7	9	12	30	20	52	152
PLT Lain	43	27	26	17	14	13	3	14	6	10	173
Total	**101**	**148**	**149**	**197**	**93**	**68**	**77**	**79**	**130**	**143**	**1185**

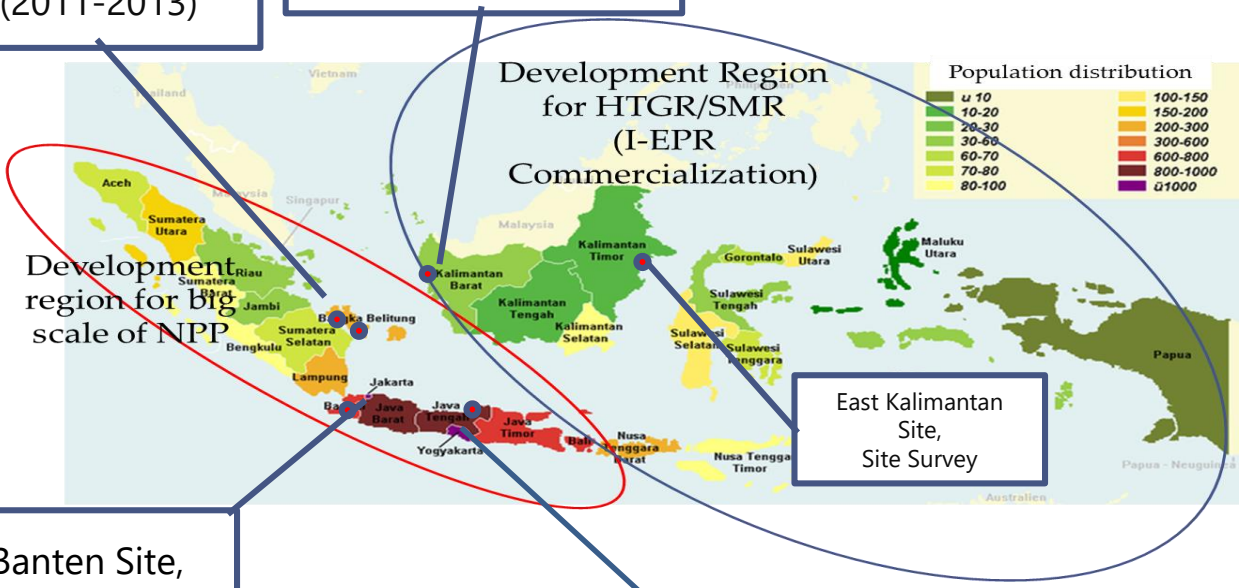
Perbandingan Kebutuhan Tambahan Pembangkit 2017 - 2018



Potential Location for NPP Deployment in Indonesia

Bangka Site, Status FS Finished (2011-2013)

West Kalimantan Site, Site Survey



East Kalimantan Site, Site Survey

Banten Site, Status: Under study (2008-2017)

Muria Site, Status: Had been evaluated (1991-1996), Now: monitoring of meteorology and micro seismic

Source: BATAN

- Large scale NPP can be developed in Sumatera and Jawa.
- SMR (*Small Modular Reactor*) can be develop in Eastern part of Indonesia, after commercially proven.

The Case for SMR

Market for power plant per unit size

At least 100 unit <100 MW equal to a business of Rp. 1000 T in ten years to 2025

Number of Unit per capacity classs **Unit**

Kapasitas	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
<50 MW	81	130	101	143	70	55	62	42	92	87	863
50-100 MW	8	9	18	19	10	9	7	23	16	24	143
100-150 MW	8	5	14	5	4	1	2	7	8	11	65
150-400 MW	2	3	9	13	6	1	6	7	10	12	69
400-600 MW			2	4	3	1				3	13
600-1000 MW	2	1	5	13		1			4	6	32
Total	**101**	**148**	**149**			**68**	**77**	**79**	**130**	**143**	**1185**

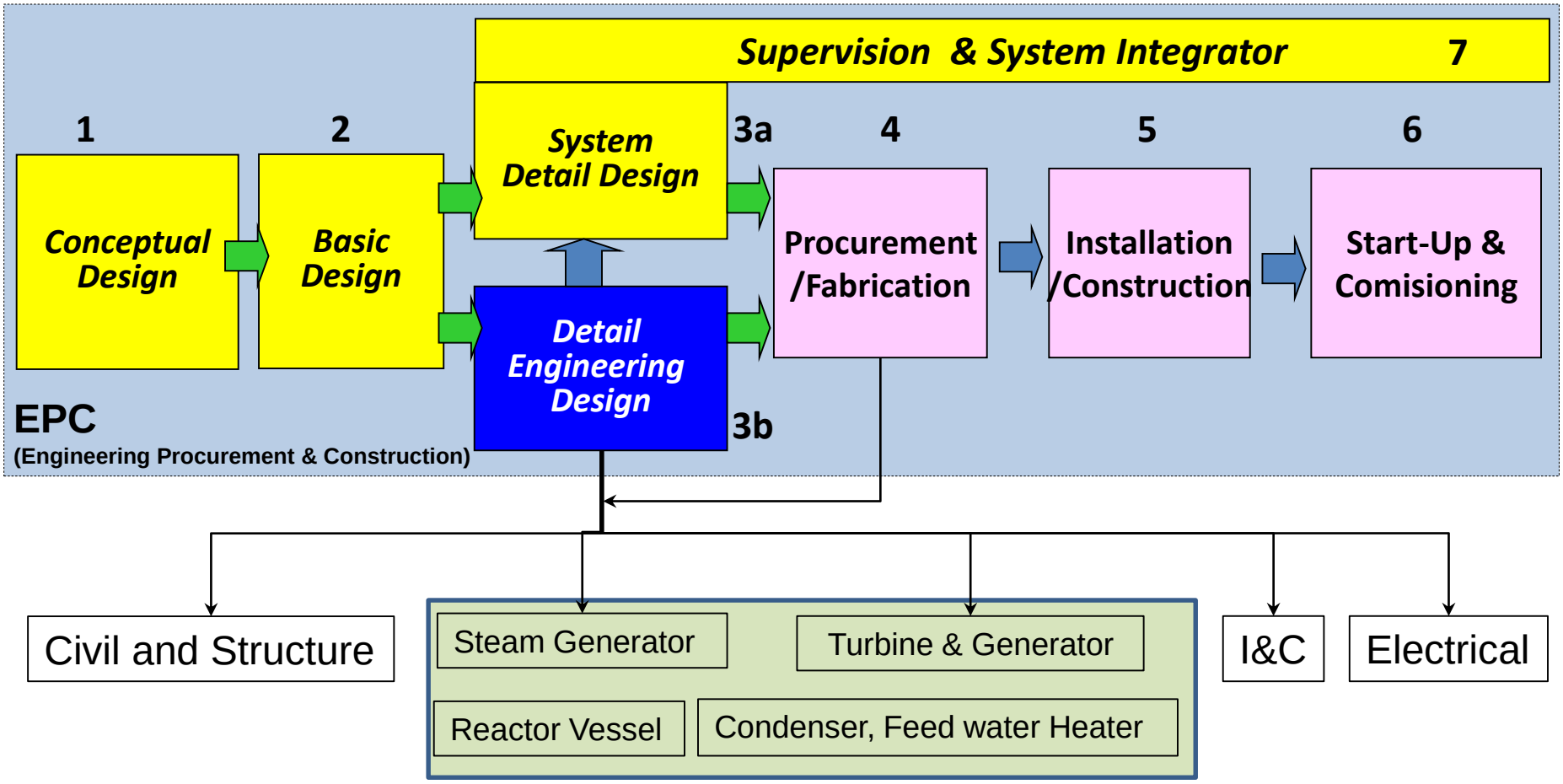
Economic benefit
Job Creation , foreign exchange saving (Rp 250T)
Secondary benefit Rp 500T
(Steel Industry, Civil, instrument, piping, services, etc)

Niche Market (Renewables)

- Wind Power
- PV
- MSW Poer Plant
- Biomass Power Plant
- Nuclear

Construction of Power Plant

Feasibility Study → Project Development, permit and Design (Engineering) → Construction and Procurement → *Start-up & Commissioning*



OUTLINE

2.
Current Mapping resuts

Mapping of National Industry Capacity

Boiler
Bobot 30%

10 Company
IHI. GE Power
BBI, Barata,
Basuki , Zug,
Atmindo, Weltes,
etc

EPC COMPANY
Bobot 5%

48 Engineering Company
Rekayasa Industri, WIKA,
Dale, Truba Enjiniring etc

Turbine & Generator
Bobot 25 %

4 Perusahaan:Barata (Siemens Ind.) Pindad, Sulzer, Nusantara Turbin & Propulsi, Texmaco

Barata Resmikan Divisi Komponen Turbin

Oktober 01 / 2018 20:47 WIB

Oleh : Peni Widarti

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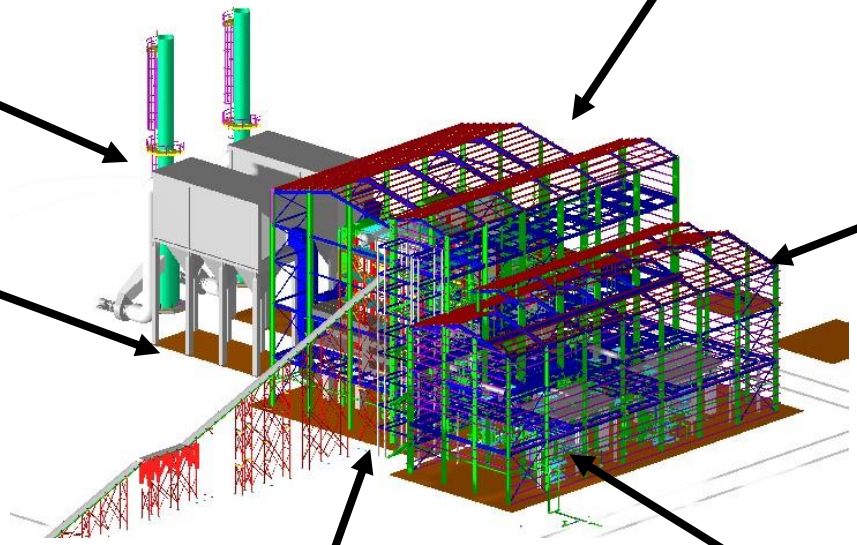
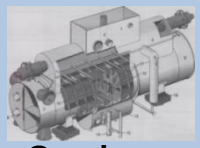
/Istimewa



Deaerator



Condensor

Fan, Pump, Compressor,

Balance of Plant
Bobot 17 %
15 Perusahaan
Boma Bisma
Indra, Barata,
,etc

Civil
Bobot 15%

Wijaya Karya,
Hutama Karya, Adi
Karya, PP etc

Electrical, Instrumentation and Control
Bobot 8 %
Siemens Indonesia, Unindo, Trafindo, etc

GRESIK dan GRATI COMBINE CYCLE POWER PLANT

PT PAL Indonesia supports to Mitsubishi Heavy Industries (MHI) as Co-manufacturer on providing the Balance of Plant equipment.

STEAM TURBINE MACHINING & ASSEMBLY (190 MW)

STEAM TURBINE BALANCE OF PLANT

• MAIN CONDENSER	3	UNITS
• DEAERATOR & STORAGE TANK	3	UNITS
• GENERAL SERVICE WATER COOLER	6	UNITS
• LUBRICATION OIL COOLER*	3	UNITS
• GLAND STEAM CONDENSER*	3	UNITS
• MAIN OIL TANK	3	UNITS
• DIRTY CLEAN OIL STORAGE TANK	1	UNIT
• CIRCULATING WATER PIPING	883	TONNES
• PLANT PIPING	1.220	TONNES

HEAT RECOVERY STEAM GENERATOR

• LP DRUM	6	UNITS

GAS TURBINE BALANCE OF PLANT MANUFACTURING

• AIR & OIL COOLER	27	UNITS
• A & B RACK	4	UNITS
• START UP UNIT	4	UNITS
• INLET / EXHAUST DUCT	9	UNITS
• BY PASS STACK	9	UNITS

Sumber : Paparan PT PAL

PT PAL to Manufacture Turbine

02 Dec 2014

Pabrik Siemens Cilegon Pernah Membuat Pembangkit Listrik 1.600 MW

Pabrik Siemens Cilegon memproduksi **kondensator besar dan bagian komponen lain yang siap dipasang pada turbin gas serta uap**.
"Pabrik kondensator Siemens Indonesia di Cilegon termasuk pabrik terbesar di dunia, karena pernah membuat pembangkit listrik terbesar untuk pembangkit listrik di Finlandia dengan kapasitas 1.600 MW pada tahun 2007," kata kata Presiden Direktur dan CEO PT Siemens Indonesia, Josef Winter.Menurut Josef Winter, di usianya yang sudah 25 tahun, Pabrik Siemens Cilegon berjanji akan terus meningkatkan produktivitas dalam industri manufaktur lokal di tanah air. **Pabrik Siemens Cilegon memproduksi kondensator besar dan bagian komponen lain yang siap dipasang pada turbin gas serta uap.**

Komitmen Siemens dalam pengembangan kompetensi sumber daya manusia ini bukanlah hal baru. Tahun lalu, Siemens Indonesia telah menyumbangkan peralatan pelatihan **untuk Laboratorium Kelistrikan dan Bengkel Mekanik milik Krakatau di Cilegon, Banten**. Kerjasama dengan perguruan tinggi itu hingga kini masih terus terpelihara.

Saat ini, Pabrik Siemens Cilegon sedang mengerjakan **"Turbin Zero", sebuah kondensator tubrin uap untuk sebuah proyek berskala international di Arab Saudi**. Sedangkan untuk pasar domestik, dirakit empat unit turbin uap berkapasitas 8,5 MW untuk Proyek PLN di Timika, Papua.

"Pabrik Siemens Cilegon juga akan memperluas portofolio produknya dengan **pembuatan turbin uap kecil untuk mendukung program peningkatan daya listrik pemerintah Indonesia**," kata Josef Winter. RAE.

Sumber : http://www.geoenergi.co/m/lens/4342/konpres-menteri-esdm-pembentukan-up3kn/

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Barata Indonesia acquired Siemens factory in Cilegon

03 August 2018 15:03

JAKARTA - PT Barata Indonesia (Persero) acquires a turbine component plant owned by PT Siemens Indonesia in Cilegon, Banten.

The acquisition of the plant is intended to improve the company's ability to meet the needs of the power plant spare parts, which has encouraged an increase in domestic component-level usage (TKDN).

Barata has an important role in the electrification program in Indonesia, in line with the government's assignment to the company as coordinator of local power station content program.

"Indonesia must be independent, we can not continously to buy from abroad continuously. With our own Siemens Factory, we not only can meet domestic needs, but can export as well," said Director of Barata Silmy Karim in the signing of purchase asset agreement at the Ministry of BUMN as

PT. Boma Bisma Indra (Persero) ASME Stamp Holder S U U2 Pp

CONDENSER
Core Product for
Steam Power Plant

ASIA

NGHISON # 1
VIETNAM

With : TITANIUM SEAL WELDING TUBE TO TUBESHEET
Size (mm) : 6000 W x 7000 H x 10000 L
Weight : 140 Ton
Customer : HITACHI M&E, Ltd.,
Years : 2012

Agency for the Assessment and Application of Technology (BPPT)

PT. Boma Bisma Indra (Persero) ASME Stamp Holder S U U2 Pp

CONDENSER
Core Product for
Steam Power Plant

Brasil

CSA Brasil

With : TITANIUM SEAL WELDING TUBE TO TUBESHEET
Size (mm) : 6525 W x 8500 H x 13800 L
Weight : 2x135 Tons
Customer : ALSTOM POWER Switzerland Ltd
Year : 1999

Agency for the Assessment and Application of Technology (BPPT)

PT. Boma Bisma Indra (Persero) ASME Stamp Holder S U U2 Pp

CONDENSER
Core Product for
Steam Power Plant

North Bangkok#28

Thailand

With : TITANIUM SEAL WELDING TUBE TO TUBESHEET
Size (mm) : 6525 W x 8500 H x 13800 L
Weight : 2x135 Tons
Customer : ALSTOM POWER Switzerland Ltd
Year : 2014

Agency for the Assessment and Application of Technology (BPPT)

PT. Boma Bisma Indra (Persero) ASME Stamp Holder S U U2 Pp

Core Product for
Steam Power Plant

PAITON
UNIT 1,2,7,8

SIZE (MM) : ID 1450 X L 13535
WEIGHT : 53.5 TON
DP (SS/TS) : 56/233 KG/CM² G
DT (SS/TS) : 272/272 °C
CUSTOMER : SUMITOMO
SUPERVISED : TOSHIBA Ltd
YEAR : 1994

Agency for the Assessment and Application of Technology (BPPT)

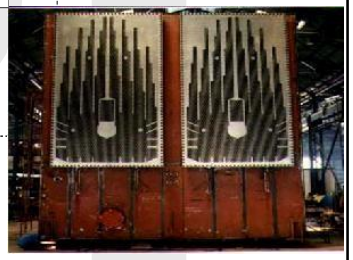
CONDENSER

Core Product for
Steam Power Plant

East Java

PAITON
PRIVATE #7&8

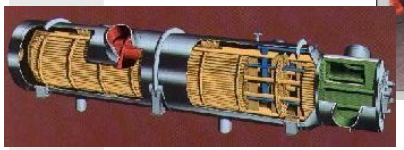
With : TITANIUM SEAL WELDING
TUBE TO TUBESHEET
Size (mm) : 7440 W x 8460 H x 9230 L
Weight : 180 Ton
Customer : HITACHI M&E, Ltd.,
Years : 1992



Core Product for
Steam Power Plant

MNI Malaysia

With : STAINLESS STELL EXPAND
AND SEAL WELD
Size (mm) : Dia 1200 x 8650 L
Weight : 3x45 Tons
Customer : EVANS DEAKIN ENG. AUSTRALIA



Gland Steam Condenser

Core Product for
Geothermal Power Plant

Mahanagdong - Philiphines

SIZE (MM) : OD 500 X L 2115
WEIGHT : 3 x 1,5 TON
CUSTOMER : TOSHIBA

WHELL HEAD SEPARATOR

Core Product for
Geothermal Power Plant

Wayang Windu

SIZE (MM) : OD 2100 X L11250
WEIGHT : 3 x 23 TON
CUSTOMER : REKIN

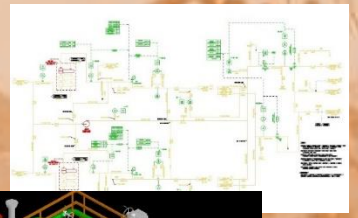
Unocal Gunung Salak

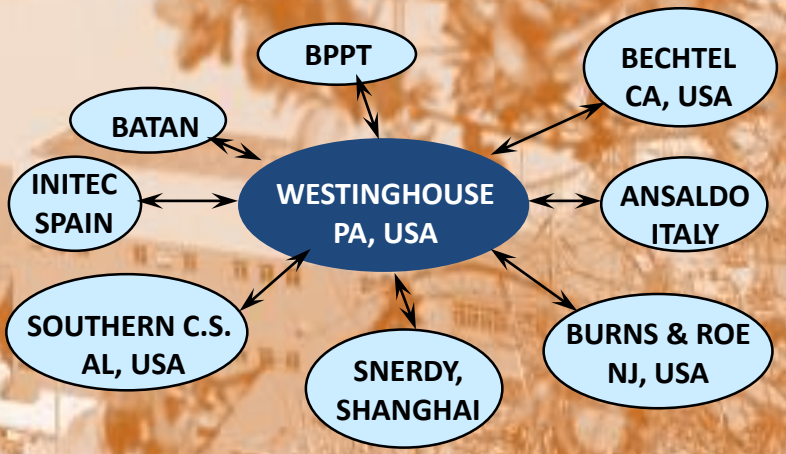
SIZE (MM) : OD 2300 X L 20250
WEIGHT : 10 x 45TON
CUSTOMER : Flour Daniel - IKPT

ENGINEERING EXPERIENCE IN NPP (BATAN-BPPT)

Pressurized Water Reactor (PWR)
Gen 3+ Westinghouse AP600/1000

Spent Fuel & South End Turb Bldg
Work Package: P&ID Design, CLD, Piping Layout, Isometric, Modularisation



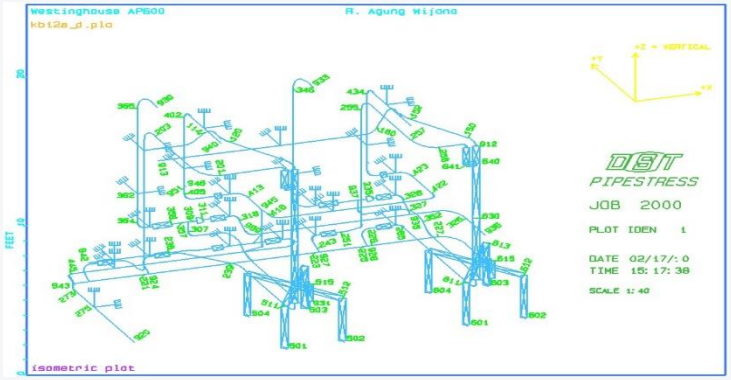


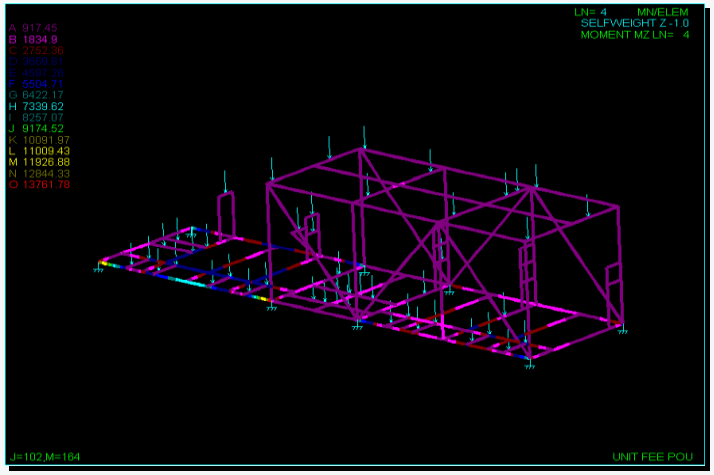
Menristek: NPP has to be prepared

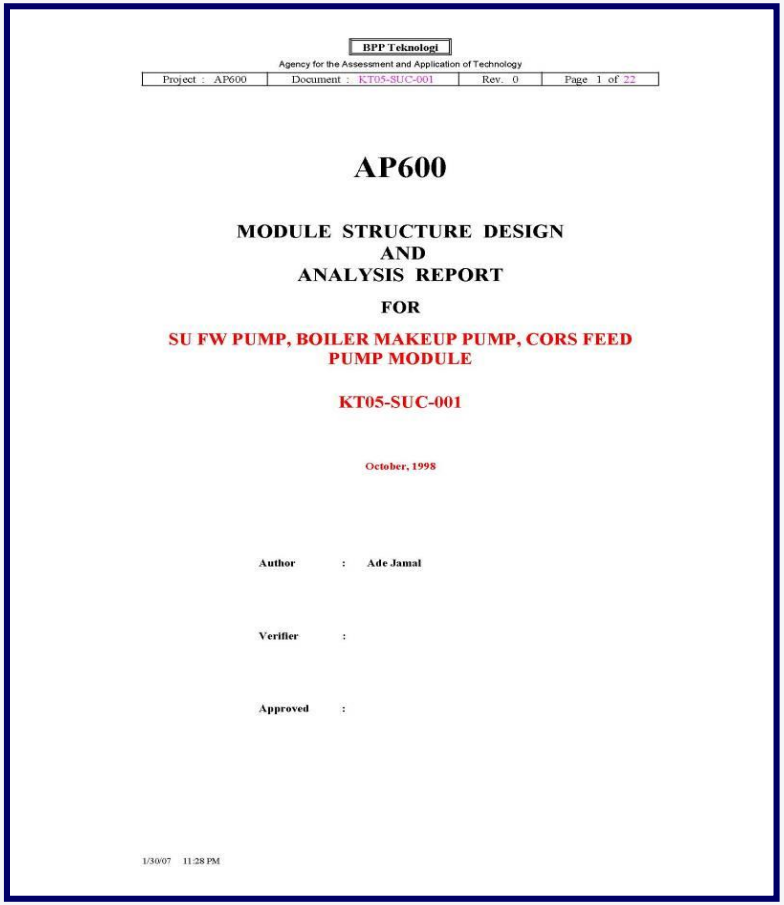
https://today.line.me/id/pc/article/Menristek+Pembangkit+Nuklir+Tetap+Disiapkan+untuk+Antisipasi-Jrw5ng

Piping and Structure Analysis

Piping and Structural stress analysis was carried to avaoid structural failures due to static load and dynamic load during transportation and operation.







BPP Teknologi
Agency for the Assessment and Application of Technology

Project : AP600	Document : KT05-SUC-001	Rev. 0	Page 1 of 22

AP600

MODULE STRUCTURE DESIGN AND ANALYSIS REPORT FOR

SU FW PUMP, BOILER MAKEUP PUMP, CORS FEED PUMP MODULE

KT05-SUC-001

October, 1998

Author : Ade Jamal

Verifier :

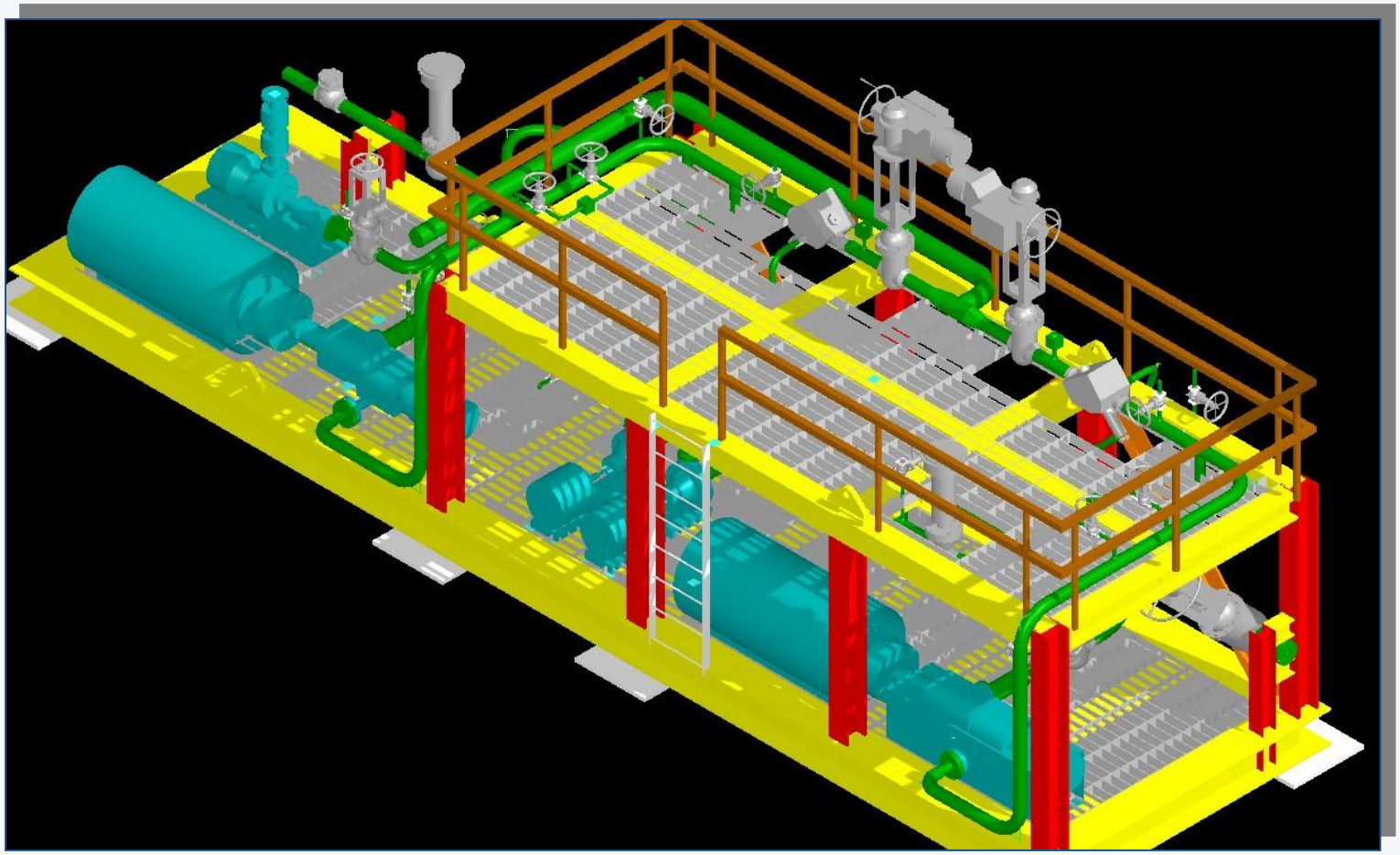
Approved :

1/30/07 11:28 PM

FEED WATER SYSTEM MODULE

BPPT - WESTINGHOUSE AP600/1000

Modularisation to a particular Start Up Feed Water System. It comprises all mechanical equipment, piping, structure, electrical and instrument to speed up as well as ensuring quality of work.



OUTLINE

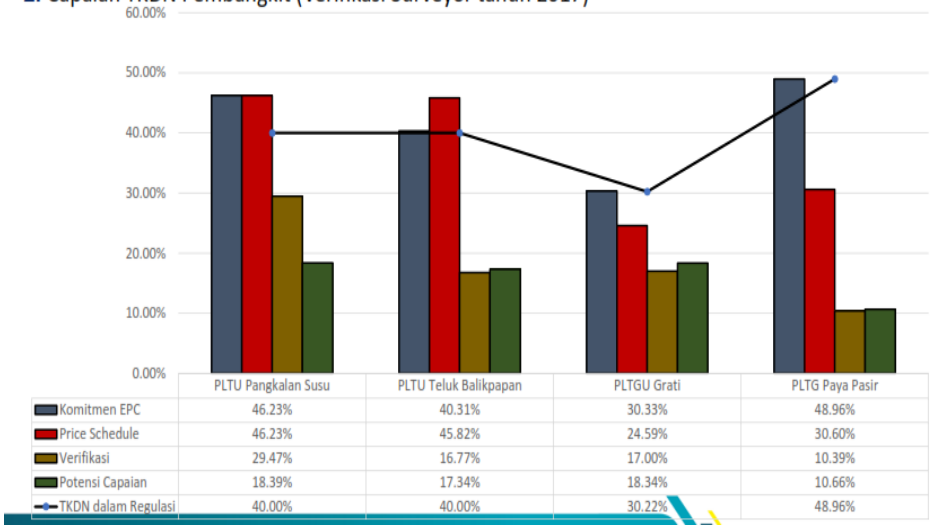
3.
Future Work

Lesson Learn: Local Contents in Power Plant Project

1. Capaian TKDN PLTU (Verifikasi Surveyor tahun 2012)

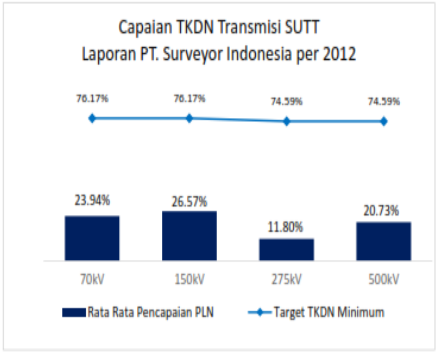
Catatan:
Berdasarkan laporan verifikasi PT Surveyor Independen dari proyek pembangkit hingga tahun 2012 (hanya memasukan proyek dengan status penyelesaian di atas 80%)

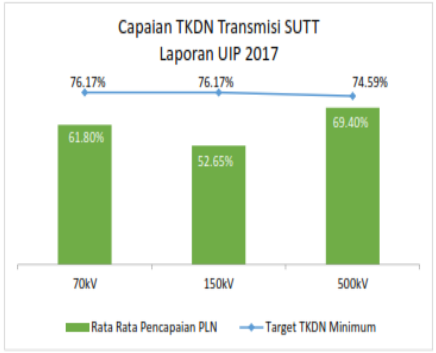
2. Capaian TKDN Pembangkit (Verifikasi Surveyor tahun 2017)



	PLTU Pangkalan Susu	PLTU Teluk Balikpapan	PLTGU Grati	PLTG Paya Pasir
Komitmen EPC	46.23%	40.31%	30.33%	48.96%
Price Schedule	46.23%	45.82%	24.59%	30.60%
Verifikasi	29.47%	16.77%	17.00%	10.39%
Potensi Capaian	18.39%	17.34%	18.34%	10.66%
TKDN dalam Regulasi	40.00%	40.00%	30.22%	48.96%

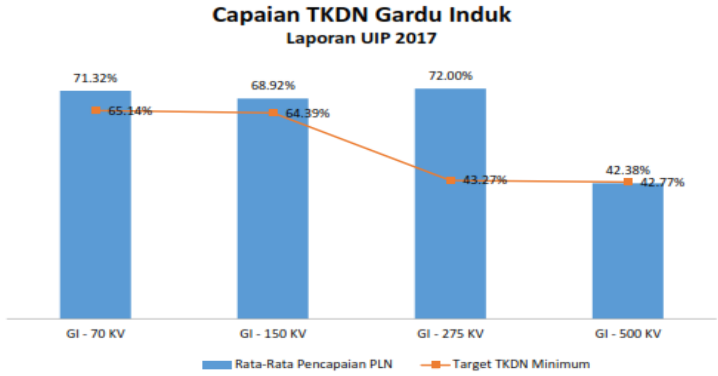
3. Capaian TKDN Transmisi (Verifikasi Surveyor tahun 2012) & 2017 (Belum Verifikasi)





SUTT = Saluran Udara Tegangan Tinggi
kV = Kilo Volt

3. Capaian TKDN Gardu Induk 2017 (Belum Verifikasi oleh Surveyor)



Source:: PLN, 2018

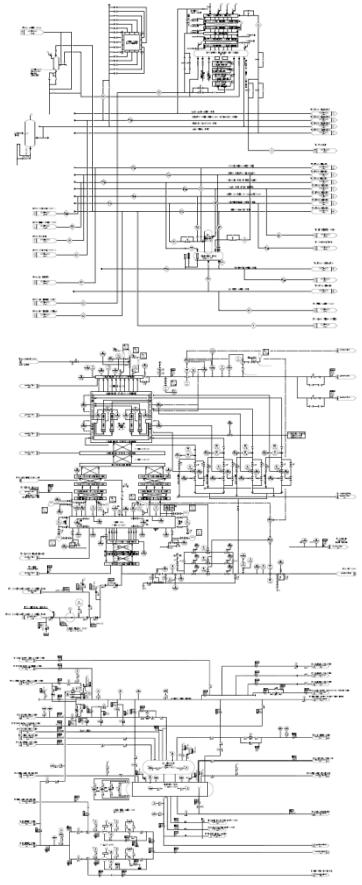
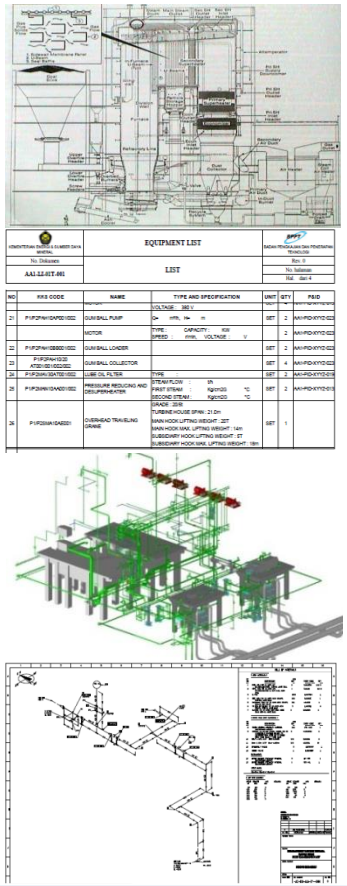
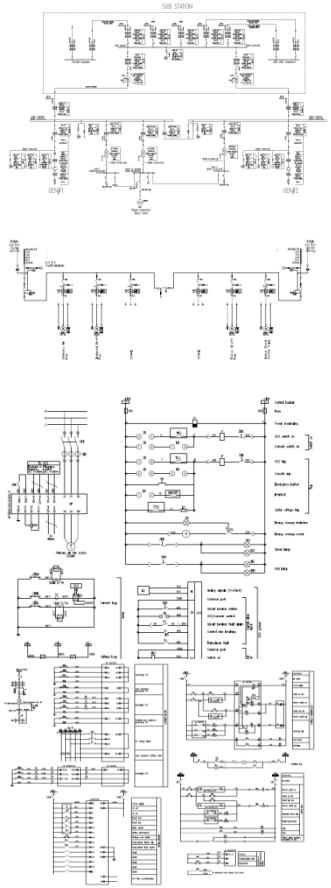
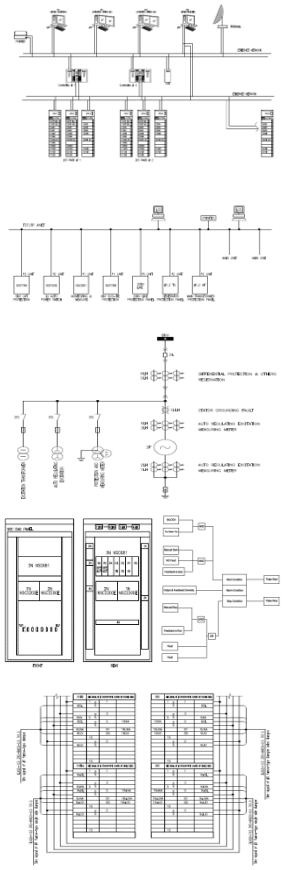
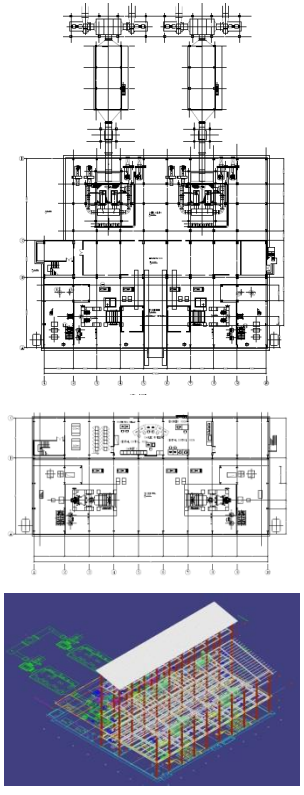
Lesson Learned: 1000 MW Project

NO	URAIAN	%TKDN		
		REGULASI PERMEN NO. 54/2012	PRE-ASSESSMENT (EPC PROPOSAL)	OPTIMALISASI TKDN
A	BARANG			
	STEAM TURBINE	0.00%	2.18%	5.46%
	BOILER	10.37%	0.00%	0.00%
	GENERATOR	0.00%	2.83%	6.21%
	ELECTRICAL	5.04%	0.00%	0.10%
	INSTRUMENT AND CONTROL	0.60%	0.00%	0.00%
	BALANCE OF PLANT	5.10%	0.62%	7.95%
	CIVIL & STEEL STRUCTURE	15.00%	34.48%	51.36%
	OTHERS	0.00%	0.00%	8.96%
	SUB TOTAL BARANG	36.10%	7.44%	14.85%
B	JASA			
	JASA KONSULTAN	1.90%		0.00%
	JASA KONSTRUKSI TERINTEGRASI(ENG,PROC,CONST)	63.41%		1.37%
	JASA PEMERIKSAAN, PENGUJIAN DAN SERTIFIKASI	4.50%		0.00%
	JASA PENDUKUNG	1.52%		60.00%
	SUB TOTAL JASA	71.33%	0.00%	6.34%
C	TOTAL	38.21%	6.03%	12.96%

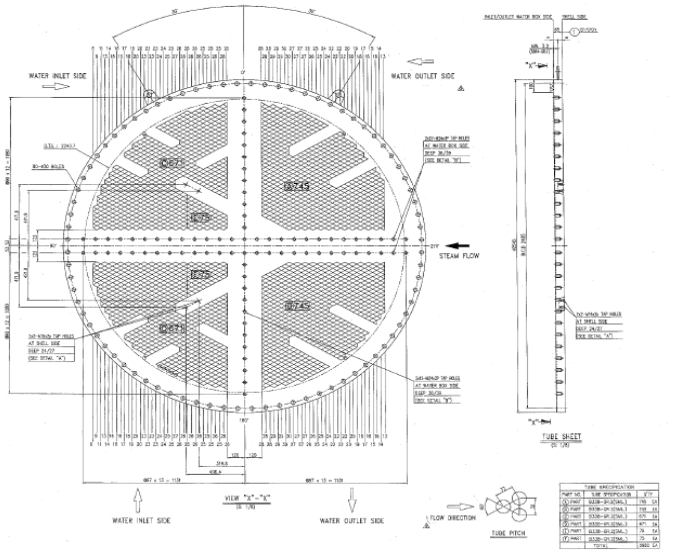
Next Work

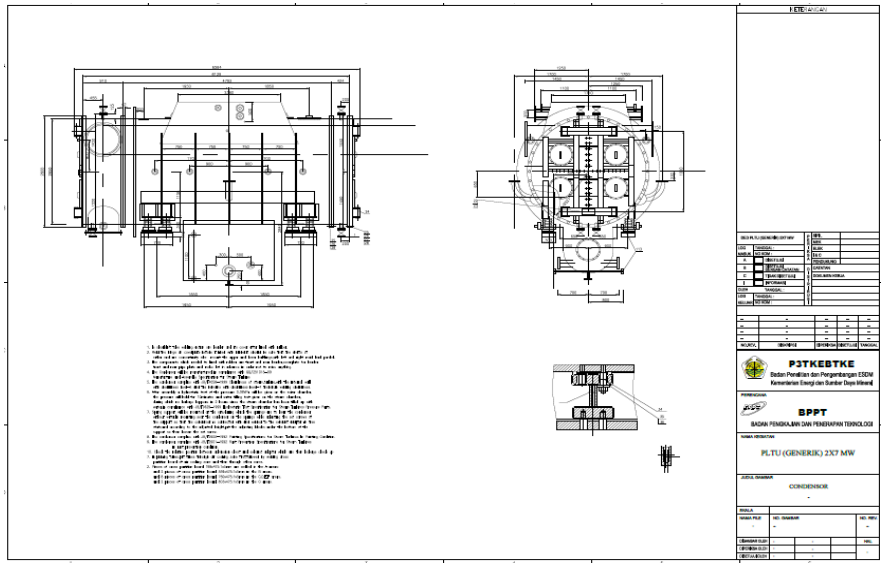
- The first 2 Nuclear Islands Components and control system are suggested to be supplied from overseas reputable companies
- Setting the Design Standar 100 MW NPP
- Focusing on Non-Nuclear Island
  - Turbine Generators
  - Turbine Bldg
  - Civil works and Structure
  - Balance of Plants (Condenser, Feed Water Heater, Feed Water heater pumps, Crane etc)
- Producing List of Equipment and Bill of Materials
- Matching the Industry with List of Components

Integrated System

THERMAL	MEKANIKAL / PIPING	ELEKTRIKAL	I&C	SIPIL&STRUKTUR
				
100 GBR + DOK	500 GBR + DOK	250 GBR + DOK	100 GBR + DOK	200 GBR + DOK

Sample Condenser Design





A. Shell side :

In/Out	Stream		Vap.	Temp.	Pressure	Mass Flow.	BM	H	density
	No.	Fluid	Fraction	C	bar.g	kg/hr		kJ/kg	kg/m3
In	10	steam from turbine *	0,930	42	0,082	32497	18	2400	69,5
In	12	steam from flash tank	-	-	-	-	-	-	-
In	14	steam from equalization box	-	-	-	-	-	-	-
In	24	Rec. Cond. From GVC	0,000	49,63	2,08	399,8	18	207,8	988,2
In	34	LP Steam from LP Heater	-	-	-	-	-	-	-
In	36	Cond. From LP Heater	0,000	78,07	0,53	2843,6	18	326,9	974,7
Out	20	Cond. Outlet	0,000	45,81	1,25	35740,4	18	191,84	989,8
Out	-	-	-	-	-	-	-	-	-

Check : total flowrate aliran masuk = 35740,4

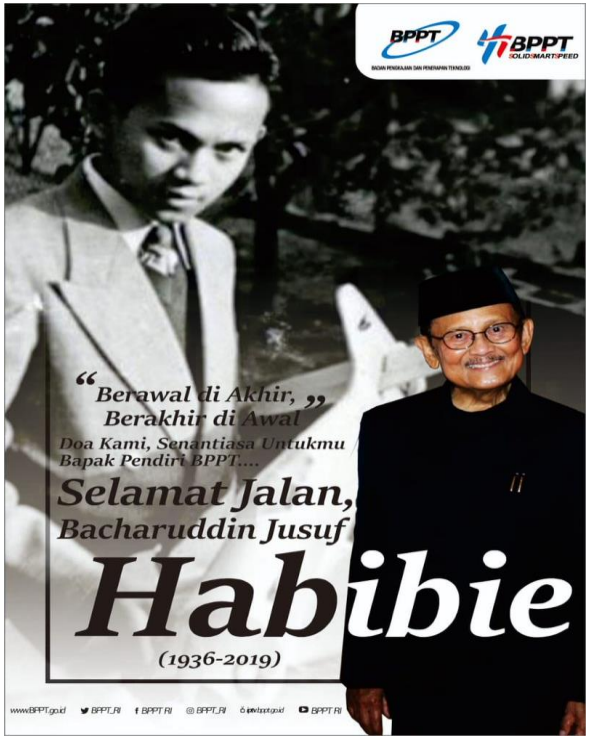
Remark : * Pressure in **bar.abs.**

B. Tube side :

In/Out	Stream		Vap.	Temp.	Pressure	Mass Flow.	BM	H	density
	No.	Fluid	Fraction	C	bar.g	kg/hr		kJ/kg	kg/m3
In	68	Cooling water input 1	0	31	1,01	958155	18	129,94	995,3
In	70	Cooling water input 2	0	31	1,01	958155	18	129,94	995,3
Out	72	Cooling water output 1	0	34	1,01	958155	18	167,59	992,1
Out	74	Cooling water output 2	0	34	1,01	958155	18	167,59	992,1

Technology Acquisition: Licensing

Simple Form



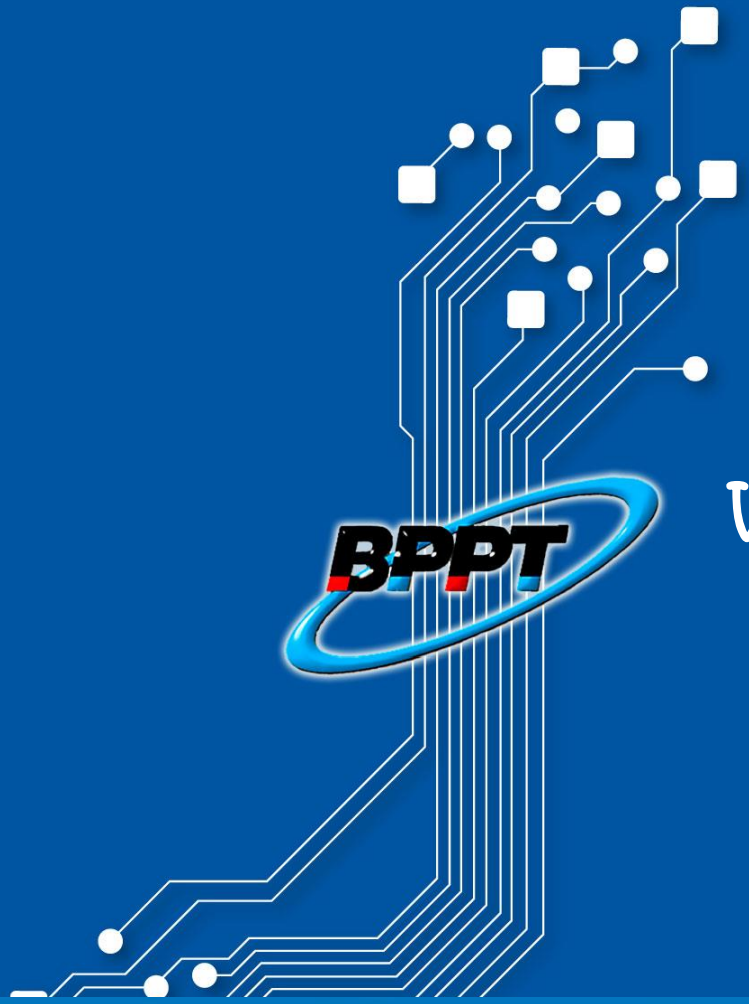
For NPP: Though Local Industries can supply the equipment, Licensing is required to promote innovation

Legacy

CASA License

SS-1/2/3 Inittially licensed from FN

Ship: Licencing from Dutch Company



... Message ...

We are competitive overseas but could not compete at home

Change