1. EXECUTIVE SUMMARY

PT. Indah Kiat Pulp and Paper, TBK (IKPP) Tangerang Mill is producer of pulp and paper with headquarter located in Jl. Raya Serpong Km 8, Tangerang Selatan, Banten 1531. Establish on Desember7th 1976. At the beginning, in 1977, this company only two paper machine that had production capacity of 100 tons/day for each machine. On April 1979, IKPP began to produce commercial product. By June 1982, IKPP added one more machine to increase the production capacity to 150 ton/day. On March 1984, this company succeeded in producing commercial product and later on April 1988 there has been several modification and reparation on its paper machines. These efforts increased the paper production until 250 tons/day.

Main energy source is electricity, used for almost the whole processes. Natural Gas is required by Turbine Gas. Data from Factory Monthly Report in the year 2013 shows that the total annual energy consumption in 2,760,786 USD (the cost of electric)

The Energy Audit at IKPP Tangerang Mill was carried out from April 1, 2014 to April 4 2014 by a team of PT TÜV SÜD Indonesia. In the audit, assistance to the energy audit team was also rendered by the factory's staffs as representative.

Based on the analysis, observation, measurement and information gathered during the walk through, the following description is summaries of the findings and reflecting the current condition of the factory and the proposed measures to enhance energy efficiency in the factory.

Energy Conservation Opportunities

The following description are summaries of the findings based on the analysis of data, measurement during the energy audit of current condition of the factory and the proposed measures to enhance energy efficiency in the future.

Installed Inverter in Electrical Motor

The use of inverters for electrical motors is assumed will get energy potential savings of 20%. By installing inverters limited in Electrical Motor **at SP 1 (refiner electrical motor, agitator electrical motor) and at in electrical Pump PM 1 medium Voltage motors only.**

The Use of High Efficient Motors

Considering the ages and condition, maintenance costs, frequent of rewinding, efficiencies, etc, some electrical motors may be considered to be replaced with High Efficient Motors (HEM). The Energy savings by replacing old motors with high efficient motors is calculated.

The Maintenance Pump

During the implementation of Detailed Energy Audit, it is. The summary of the energy measures recommendation, including the energy savings and the required investment is shown on Table 1.1.

Table 1.1 Recommendation of Energy Savings

NO	MEASURE	ENERGY SAVING	COST ANNUAL SAVING	SIMPLE PAYBACK PERIOD	REMARK
		kWh/years	USD	Years	
I	**Installed Inverter driver in Electrical Motor**				
	SP 1:				
1	REFINING,REFINER 9 (SPM 1)	1054974	133408	1.07	High Cost
2	REFINING,REFINER 1,LBKP LINE	688559	82110	1.74	High Cost
3	AGITATING,PULPER 6	604862	73965	1.45	High Cost
	MP 1:				
4	COMPRESSOR 1(ATLAS COPCO)	565171	71266	1.10	High Cost
5	COMPRESSOR COOPER	482106	59678	1.31	High Cost
6	PICK UP VACUUM PUMP HIGH PRES, 1ST P	384167	47532	1.32	High Cost
7	SUCTION FELT VACUUM PUMP	257606	29814	2.10	High Cost
8	COUCH, VACUUM PUMP WIRE PART	315803	39747	1.12	High Cost
9	PICK UP VACUUM PUMP LOW PRES, 1ST P	360015	45937	0.97	High Cost
10	DRY LINE ON LINE, VACUUM PUMP WIRE PART	495768	65836	0.54	High Cost
II	**Replacement with motor HEM**				
	SP 1:				
1	PUMPING,WHITE WATER	2904	423	5.97	Medium Cost

	PIT 1				
2	PUMPING,PULPER 6	1969	287	8.80	Medium Cost
3	PUMPING 1A,FLOW TANK 1-2 REF AREA,LBKP	5084	740	2.53	Medium Cost
4	PUMPING 1C,FLOW TANK 1-2,REF AREA,LBKP	4481	652	2.87	Medium Cost
5	PUMPING,MEDIUM CHEST 11,SPM 1/70M3	3915	570	3.28	Medium Cost
6	Chest Agitator No.9	3114	453	3.70	Medium Cost
7	Chest Pump No.10	3425	499	3.36	Medium Cost
8	Chest Agitator N0.12	2408	350	4.78	Medium Cost
9	Chest Agitator No11	2637	384	4.37	Medium Cost
	PM 1:				
10	PUMP CENTRIFUGAL CLEANER 2	12776	1859	3.40	Medium Cost
11	SUCTION BOX, VACUUM PUMP WIRE PART	7131	1038	4.97	Medium Cost
12	PUMPING SHOWER SILO PIT, WIRE (DILUT 3)	2920	425	5.94	Medium Cost
13	COLLECTION TANK 50M3, WHITE WATER	3021	440	5.74	Medium Cost
14	PUMPING, COUCH BROKE PIT	3076	448	5.64	Medium Cost
15	EXHAUST FAN No. 1, GROUP 1	6073	884	2.11	Medium Cost
16	EXHAUST FAN No. 3, GROUP 3	5772	840	2.22	Medium Cost
17	EXHAUST FAN No. 5, GROUP 5	5840	850	2.20	Medium Cost
18	Heater No.1	2169	316	2.06	Medium Cost
19	Agitating Calen Broke PIT	10198	1484	3.48	Medium Cost
20	Cleaning of Drier Surface				Low Cost
21	Evaluation of Steam pipe Isolation				Medium Cost
III	**Maintenance Pump**				
1	Installation of newer, higher efficiency pump typically leads to pump system energy savings to 10 %.	energy savings to 10 %		11	Low cost
2	Replacing of standard V belt with Cog Belt	energy savings to 2 %		11	Low cost
3	Surface Coatings or Polishing	energy savings to 2 -3 %		11	Low cost
4	Belt Evaluation	1.2 %			Low cost

Note:

1. Low Cost : Investment less than or equal to IDR 30.000.000
2. Medium Cost: Investment greater than 30.000.000 and less than IDR 100.000.000
3. High Cost : Investment greater than IDR 100.000.000

The Assessment on Power Quality

From these measurements, assessment is done by using limit standard in which voltage harmonic is 5% while current harmonic is 15%. (IEEE Standard 519-1992), and the result is as follow (see Attachment 6: Measurement on Harmonic Distortion) :

- Total Harmonic Distortion (THD) Voltage and Total Harmonic Distortion (THD) Current
  - Electrical motor pump and panel compressor that Total Harmonic Distortion (THD) Voltage level is still acceptable because it is still below the level of standard.
  - Also on Electrical motor pump and panel compressor that Total Harmonic Distortion (THD) Current level is still acceptable because it is still below the level of standard.

- Values of the voltage measurement results show that the variance of voltage levels still good within standard range. The voltage unbalance also looks within average in large, visible in the graph where see line R, S and T almost always coincide fairly stable in value.

Action Plan

Energy conservation measures that do not require a budget or only need small investment (No/Low Cost energy conservation measures) can be implemented immediately with preparations include preparing equipment and personnel required. Furthermore, conduct of equipment installing (if any) and followed by

monitoringof the results achievement.These No/Low Cost energy conservation measures could be treated as a first priority in the action plan.

During the implementation of those measures, IKPP Tangerang Mill could be assisted by consultant.