附錄五、印尼工業部資料

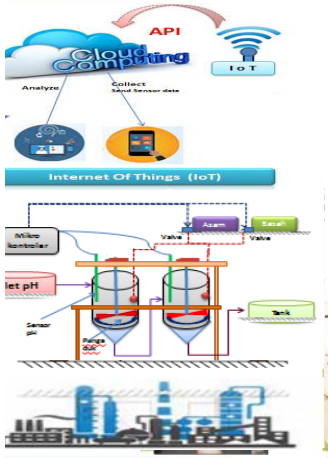
PENDAHULUAN

.....

a. State of The Art

a. **Perancangan Otomatisasi Pengatur pH Limbah Industri Menggunakan Mikroprosesor MPF-1 (Santoso, 2006)**
   Output alat pendeteksi dengan pH sensor pH maks 8 buah yang terintegrasi dengan pompa air dan sistem pengaduk (4 buah) perangkat lunak yang digunakan adalah bahasa mesin 2-80

b. **Sistem Otomatisasi Pengkondisian Suhu,pH dan Kejernihan Air Kolam Pada Pembudidayaan Ikan Patin (Adi Ranu)**
   pH diharapakan 6-8. Saat pH air kolam berada pada keasaman diluar kisaran tersebut → sensor akan memberikan sinyal kepada mikrokontroler **ATMega 32** untuk kemudian menggerakan valve.



PENGGUNAAN PLATFORM IoT - CLOUD UNTUK APLIKASI OTOMASI pH

Oleh :
Nurul Mahmidah A
Aan Anto S.
Rieke Y
Handaru
Mustofa S.

Penelitian @ 2018

1. PENDAHULUAN
2. TUJUAN & KELUARAN
3. ROAD MAP
4. METODOLOGI PENELITIAN
5. Potensi Komerisalisasi & Paten

b. Latar Belakang

Pengaturan pH :

a. **Manual** → Operator yang selalu siap
Kesalahan operator fatal terhadap operasional selanjutnya

b. Otomatis → Tidak perlu pematauan kontinyu
Sensor untuk menambahkan cairan asam/basa

Kondisi Pengaturan pH otamasi saat ini:

- Biaya mahal alat (panel digital Prominent) Rp. 35.000.000,-
- Membaca input pH dan output pH → penambahan asam/basa
- **belum bisa** merekam data secara real time

a. State of The Art

C. **Implementasi IoT (Internet of Things) dalam pembelajaran di Universitas Kanjuruhan Malang, (Muhammad Priyono, 2015)**
Arduino perangkat Embedded System terhubung dengan Internet control menggunakan WEB dan Mobile Computing (Atmega 8051, Motorola 68H11)
Kendali LED dengan Android

D. Implementing and Developing Cloud Computing Applications. New York : CRC Press. Sarna, David E.Y. 2010.
Implementasi & Developing Cloud Computing

b. Latar Belakang

Pengiriman data →
realtime, cepat, akurat & dapat diakses dengan mudah Sumber Daya TI handal (hardware server storage, software, networking , power. dll...)

Solusi Industri →
IoT - Teknologi Cloud Computing - open source

IoT konsep

Platform IoT-Cloud.

Embeded System - Jaringan internet + Teknologi Cloud Computing
" IoT-Cloud "

b. Latar Belakang

pH :

derajat keasaman meterial menyatakan keberhasilan/ kejanggalan produk
Pengaturan kondisi pH dalam air (netral, asam, basa)

"Pada Proses Industri atau pengolahan limbah dilakukan pengaturan pH untuk membentuk produk/meraih tujuan tertentu"

Pengaturan dilakukan dengan menambah asam/basa, Contoh:

1. Proses Industri Tekstil → penambahan NaOH
2 . **IPAL** pengaturan pH → keberhasilan pengolahan limbah

e. Kontribusi Terhadap Industri Nasional

Penelitian ini berkontribusi terhadap :

Industri yang menggunakan setting pH dalam prosesnya

→ otomasi dan pelaporan sistem lebih efektif, ekonomis dan realtime

c. Dasar Pertimbangan

a. **Platform IoT – Cloud** dapat **integrasikan** Proses industri
b. Pentinggnya pengaturan pH secara otomatis
c. Penyimpanan , akses data secara real time dan mudah
d. Keterbatasan alat pH di pasaran
(mahal, kendala akses/monitor secara real time)

Sehingga perlu dilakukan penelitian

PENGGUNAAN PLATFORM IoT - CLOUD UNTUK APLIKASI OTOMASI pH

Tujuan:

Penggunaan Platform IoT-Cloud untuk Aplikasi Otomasi pH:

- ✓ **Integrasi Platform IoT – Cloud** dapat **integrasikan** Proses industri
- ✓ Pemantauan secara real time
- ✓ Mudah Pengoperasian (*User Friendly*)
- ✓ Dapat diakses dengan mudah berbagai media (komputer, laptop, smartphone)
- ✓ Akurasi tepat

Keluaran penelitian:

Protipe alat (hardware dan software)
Laporan penelitian.

d. Kaitan RIPIN - Fokus Balai

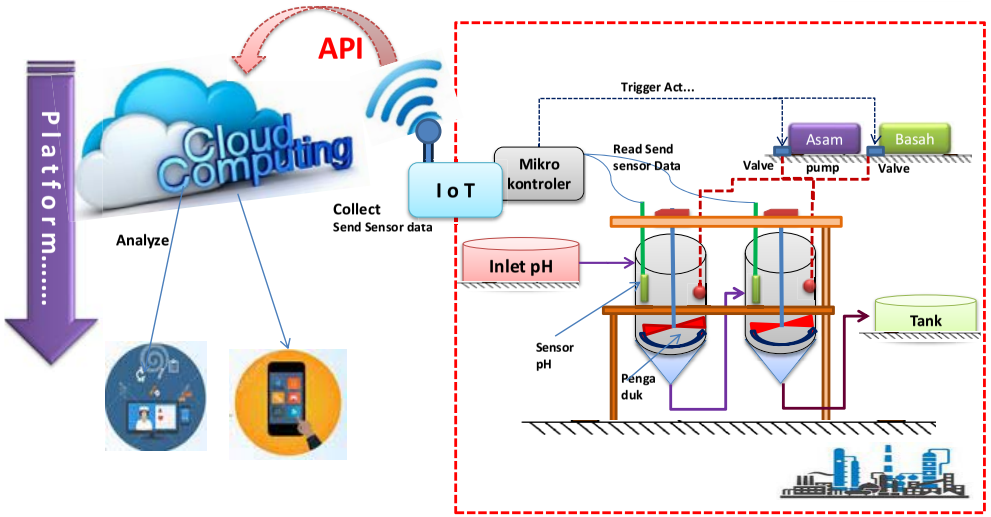
Tabel 4.2 Kebutuhan Teknologi Industri Prioritas
Kebutuhan Teknologi yang dikembangkan:

4. Komunikasi nirkabel&optikal
7. Pengukuran presisi ..... Akurasi
8. Cloud Storage
9. Real Time Kontrol

Fokus Balai:

Elektronika - Telematika - Mekatronika - Lingkungan

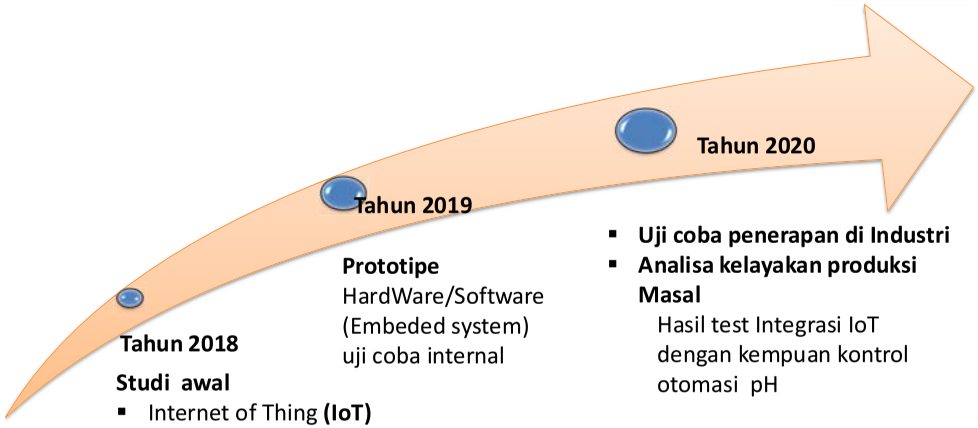
.: Desain awal Riset - IoT-Cloud Otomasi pH



Internet Of Things (IoT)

Otomasi pH

.: 2. RoadMap



Tahun 2018

Studi awal

- Internet of Thing **(IoT)**
- otomasi pH

Prototipe
HardWare/Software
(Embeded system)
uji coba internal

- **Uji coba penerapan di Industri**
- **Analisa kelayakan produksi Masal**

Hasil test Integrasi IoT dengan kempuan kontrol otomasi pH

Penggunaan Platform IoT - CLOUD Untuk Aplikasi Otomasi pH

.: Desain Riset - IoT-Cloud Otomasi pH

Prinsip kerja alat adalah Otomasi pH :
Cara kerja alam otomasi pH menggunakan mikrokontroler.

1. Sensor pH membaca air → dicek dalam kritria asam/basah
2. Mikrokontroler secara otomatis akan merintahakan penambahan:
   a. cairan basah : kondisi asam
   b. cairan asam : kondisi basah
3. Penambahan cairan akan terus dilakukan sampai sesuai dengan output pH keluran

Prinsip Kerja IoT-Cloud :

1. Hardware yang dilengkapi modul IoT - Sensor pH membaca cairan
2. Modul IoT - Mikrontroler mengirimkan data pH menggunakan jaringan Internet Menggunakan protocol Key API (Application Program Interface)
3. Di Simpan pada Cloud Data Center - aplikasi beserta data base
4. Cloud melakukan Analisa Data dan mem-Visualisai
5. User mengakses Akses data dengan berbagai media yang terhunbung dengan internet : Laptop, computer, HP, tablet dll.

.:: 4. Metode Penelitian

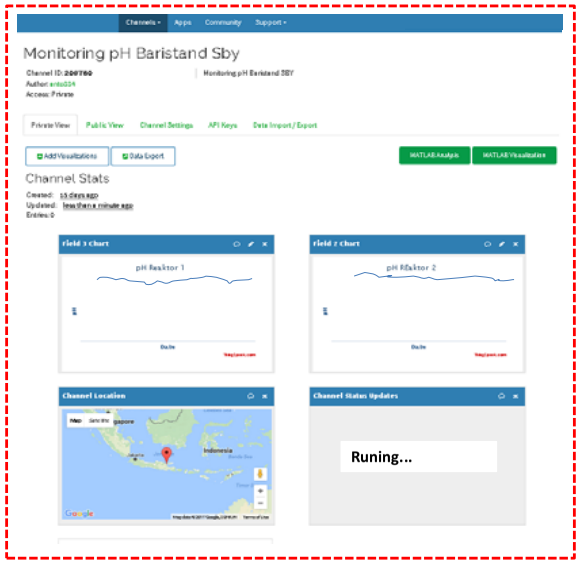
1. STUDI LITERATUR (IoT-Cloud, Otomasi pH)
2. Perancangan IoT – Cloud
3. Otomasi pH
4. Integrasi IoT Cloud...Otomasi pH - Uji Coba
5. Hasil & Pembahasan

.:RINCIAN ANGGARAN BIAYA

No	Uraian	Jumlah	% bagian
1	Honor Output	14.700.000	11,8
2	Belanja Bahan	14.550.000	11,7
3	Belanja Jasa lainnya	8.000.000	6,4
4	Belanja Perjalanan Dinas	8.070.000	6,5
5	Belanja Modal	79.000.000	63,5
	TOTAL	124.320.000	100,0

➢DETAIL RAB

.: Cara Kerja



TERIMA KASIH

.: 5. Potensi Komersialisasi / Paten

➢KOMERSIALISASI
alat di desain yang dapat di gunakan pada industri yang memerlukan setting pH dengan cepat

➢PATEN
Alat otomatisasi pH yang terintergrasi IOT -Cloud

About MIDC

BALAI BESAR LOGAM DAN MESIN

Established : 1969

Vision : 2020 Become the leading R & D institution in Indonesia and the world in process design and engineering product in the field of metal and machinery

Mission : Implementation R & D, consultacion & supervision, testing & callibration, product & personal sertification, quality system management certification, green industry management








RARE EARTH RECYCLING FROM WASTE ELECTRICAL COMPONENT BY 4.0 INDUSTRIAL TECHNOLOGY APPLICATION

Metal Industries Development Center
Jakarta
June 25, 2018

Kementerian Perindustrian
REPUBLIK INDONESIA

MIDC
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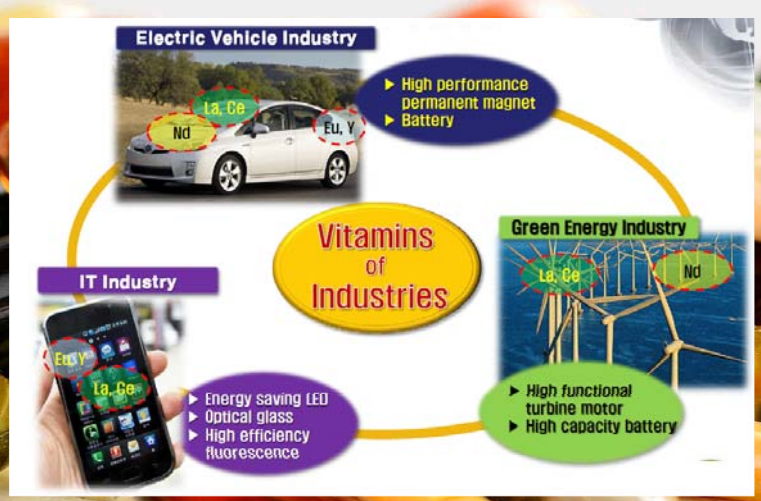
Introduction



Rare Earth Metals

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Outline

Kementerian Perindustrian
REPUBLIK INDONESIA

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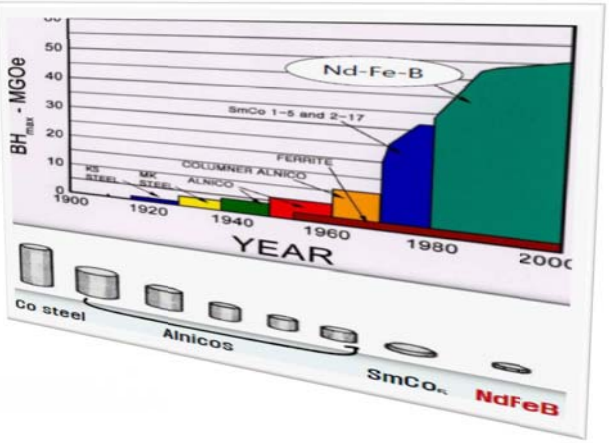
Introduction



Kementerian Perindustrian
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NdFeB Permanent Magnet R & D

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Introduction

Kementerian Perindustrian
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Rare Earth Metals

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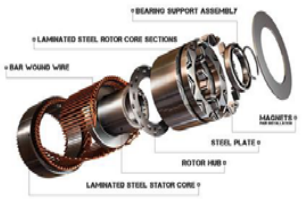
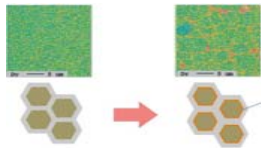
Introduction

- temperature of motor increasing, decreasing the coercivity of NdFeB permanent magnet
  - *Alloying Dy / Tb about 10% efective, but very expensive*
    - *Inovation :* ***grain boundry disffusion process*** → ***High coercivity***





Kementerian Perindustrian
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NdFeB Permanent Magnet R&D

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Introduction

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Rare Earth Metals

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Project Approaching (1)

circular economy

Minimizing the disposal of waste and the need for raw materials by keeping the existing materials and assets in the production cycle

Making and throw away **become** reusing, recycling and repairing

The concept of a circular economy as a solution for the problem of limited natural resources while encouraging the economic growth

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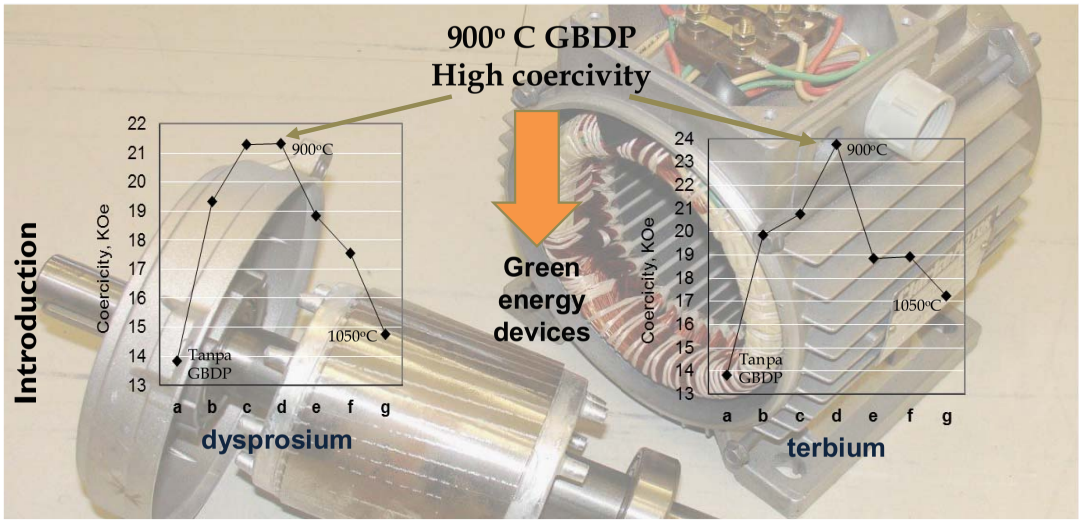
MIDC BALAI BESAR LOGAM DAN MESIN

Introduction



Kementerian Perindustrian REPUBLIK INDONESIA

NdFeB Permanent Magnet R&D

MIDC BALAI BESAR LOGAM DAN MESIN

Project Approaching (2)

The collecting infrastructure

First stage (communities)

- Gatherer (*pemulung*)
- Collector (*pengepul*)

Separating and collecting valuables electronic components that containing the rare earth metal

Second stage (MIDC)

Separating and recycling the rare earth from the electronic components

Kementerian Perindustrian REPUBLIK INDONESIA

MIDC BALAI BESAR LOGAM DAN MESIN

Objective of Project

Collaboration between MIDC and MIRDC in the field of rare earth recycling from waste electrical equipment based on 4.0 industry technology and circular economy approach

Kementerian Perindustrian REPUBLIK INDONESIA

MIDC BALAI BESAR LOGAM DAN MESIN

Schedule

Year	Activity
2019	a. Installation equipments and applying 4.0 industry technology at waste electronic process; b. Dispatch Technical Experts; c. Conducting Joint Research
2020	a. Introducing and Establishment Circular Economy of Electronic Waste Process; b. Conducting International Seminar (Electronic Urban Mining)
2021	Introducing and informing to Taiwan investors to build permanent magnet and other related factories in Indonesia

Project Approaching (3)

Process in MIDC

- ✓ First: removal of hazardous components, for instance: CFC (refrigerator) ; Hg element (electronic devices)
- ✓ Second: dismantling line (dismantling, shredding and separation)
- ✓ Third: recycling and recovery the valuable rare erath metals

The all processes based on 4.0 industry technology

Conducting by joint collaboration between MIDC and MIRDC

Sharing and Estimated Budget

	Year	Activity	Estimated Cost Rp. (NT $)*
MIDC	2018	Location for separating and recycling electrical component (600 m^2)	3.600.000.000,- (7,739,355.70)
UNDP	2018	Building and waste electrical component separating equipment	6.000.000.000,- (12,898,926.16)
MIRDC	2019	Equipments for conducting 4.0 industry technology	5.700.000.000,- (12,253,979.86)
		Dispatch Technical Experts	1.200.000.000,- (2.579.785.23)
		Conducting Join Research	900.000.000,- (1.934.838.92)
	2020	Establishment Circular Economy	750.000.000,- (1.612.365.77)
		Conducting International Seminar	200.000.000,- (429.964.21)
	2021	Informing to Taiwan investors	350.000.000,- (752.437.36)
		Total Cost (2019-2021)	9.100.000.000,- (19.563.371.35)

Benefit and Technology Transfer Plan

- ✓ Equipment and censor devices (this project) from Taiwan industry.
- ✓ Improving the humanity and economical value such as healthier, environtmental friendly and green industry
- ✓ The opportunity of Taiwan investor to build the factory that making the permanent magnet to support electric vehicle, power generator, electrical device industries in Indonesia


Thank You for Your Attention
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3 types of major solid waste

REJECT PLASTIC
- Cap. 500 ton/month
- MC: 40-50 %
- CV: 7002 kcal/kg
- disposal: landfilling

FLY ASH
- Cap. 5 ton/day
- Composition: Si & Al
- disposal: landfilling

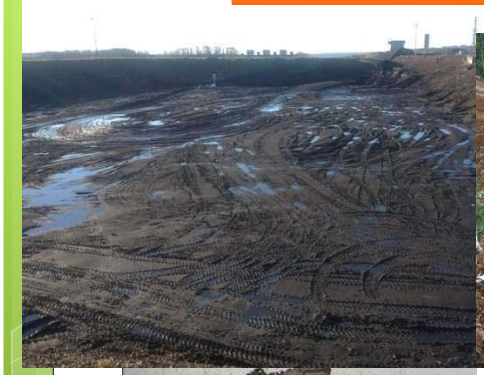
SLUDGE
- Cap. 28 ton/day (MC. 60%)
- CV: 2900 kcal/kg (MC. <20%)
- disposal: landfilling

UTILIZATION OF SOLID WASTE FROM PAPER MILLS AS RENEWABLE ENERGY AND CATALYST/ADSORBENT

Team:
1. Sari Farah Dina
2. Justaman A Karo-karo
3. Azwardi
4. Edwin H Sipahutar
5. Harry P. Limbong
6. Siti Masriani Rambe
7. Marisa Naufa

CENTER FOR RESEARCH AND STANDARDIZATION OF MEDAN INDUSTRY
AGENCY OF INDUSTRIAL RESEARCH AND DEVELOPMENT
MINISTRY OF INDUSTRY - REPUBLIC OF INDONESIA

Landfilling Area



Introduction

- ✓ Plant Location : Jln Utama Desa Dalu X no. 10 A-B Tanjung Morawa
- ✓ Produce : Kraft liner & Medium (300-350 ton/day)
- ✓ Raw material: 100% Waste Paper (OCC import)
- ✓ Water consumption : 16-20 to 1 (ton/ton product)
- ✓ Power plant unit : 5.9 MW, it takes 5.02 t/hr of coal

Objectives:

- ✓ To characterize reject plastic and fly ash from paper mill's waste.
- ✓ To plan management system of reject plastic waste from paper mill as renewable energy source.
- ✓ To conduct the design and engineering of reject plastic processing unit.

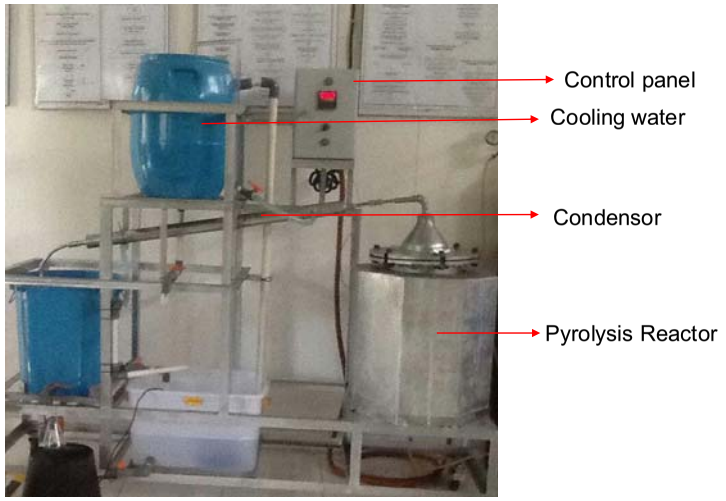
Targets and Benefit

- ✓ Being one of paper mill waste handling solution that had been only discarded in landfilling
- ✓ Can utilize processed reject plastic as fuel substitution or chemical solvent.

Literature review:
Reject Plastic Treatment Through the Pyrolysis Process to Produce Kerosene and Derivatives

Author, Years	Resume
D.Mustofa, 2014	Using Poly Propylene, Pyrolysis temperature of 425 & 900 ^{O}C. CV (425^{O}C) : 41.870 J/g CV (900^{O}C): 46.848 J/g. At higher temperatures (T=900^{O}C), carcinogenic compound are decreasing
Agus Syafrianto, 2011	Using mix reject plastic Pyrolysis: T 530 ^{O}C for 2 hours. Every 1 kg of plastic obtained yield of 300 ml (CV 10.519 Cal/g ≈ 44.040,95 J/g) equal to gasoline 10.285 Cal/g ≈ 43.061 J/g
Aprian et al, 2011	Using LDPE, Pyrolysis: T 250 - 420 ^{O}C T: 0-60 minutes Produce: kerosene

Pyrolysis Reactor



Principle

Pyrolysis :

a thermal decomposition process that occurs in the absence of oxygen where large hydrocarbon molecules are broken down into smaller ones producing of gas, liquid, and solids

the use of ***catalysts*** in the **pyrolysis process** :

*is essential for **obtaining good hydrocarbon quality.** This catalyst is used **to reduce the energy during the combustion process** (Ermawati, 2011). The catalyst **not only affects the product structure, but also the yield** (Kumar et al., 2017).*

Budget Plan

No	Items	Volume	Unit	Fee, (IDR)	Sub Total (IDR)
I	Materials:				
	Raw material	1	package	10.000.000	10.000.000
	Chemical additives	1	package	75.000.000	75.000.000
II	Equipment:				
	Control panel	1	unit	20.000,000	20.000.000
	Power meter	1	unit	15.000.000	15.000.000
	Analitical Balance	1	unit	10.000.000	10.000.000
	Maintenance and repair of Pyrolysis Reactor	1	unit	15.000.000	15.000.000
III	Travel Expense:				
	Travel to industry	40	MD	620.000	24.800.000
	Travel to Bandung	4	MD	7.600.000	30.400.000
	Travel to abroad (Taiwan)	6	MD	60.000.000	360.000.000
IV	Testing :				
	Heating value	27	Samples	350.000	9.450.000
	Compound analysis	27	Samples	750.000	20.250.000
V	Others				
	Consumer goods	1	package	10.000.000	10.000.000
	Final Report	1	document	2.000.000	2.000.000
TOTAL (IDR)					601.900.000

Research Variable

Variables used in this study include:

a. Fixed Variables

Amount of reject plastics: grams

Pyrolizing time: 2 hours

b. *Free Variables*

- Amount of catalyst (*fly ash*): 0, 10, 15 and 20%
- Temperature of pyrolysis: 150, 200, 250 and 300°C

Schedule Year-1

No	Activities	Month											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Literature review												
2	Data collecting												
3	Characterization of Reject Plastics and fly ash (testing of composition and physical / chemical properties.												
4	Maintenance and repair for pyrolysis reactor and condensor												
5	Installation of pyrolysis reactor												
6	Reject plastic pyrolysis trial												
7	Testing and data analyse												
8	Report making												

Procedures:

1. Pyrolizing Process

The reject plastic is chopped into smaller pieces and then mixed with the amount of fly ash according to research variables stated. The pyrolysis takes place inside the reactor at 150 ° C for 2 hours. The resulting gas goes out to the condenser until it turns into liquid. The experiment was repeated with the amount of fly ash of 10%; 15%; and 20% by weight of reject plastic and temperature are 200; 250 and 300°C.

2. Product Testing

The pyrolysis fuel oil is characterized by test for density, viscosity, calorific value and its composition to know the components contained in the product.

FLY ASH TEST RESULTS				
No	Parameter	Unit	Results	Methods
1	SiO2	%	65.43	ASTM D 3682 - 06
2	Al2O3	%	19.07	ASTM D 3682 - 06
3	Fe2O3	%	5.77	ASTM D 3682 - 06
4	CaO	%	1.92	ASTM D 3682 - 06
5	MgO	%	1.88	ASTM D 3682 - 06
6	K2O	%	0.40	ASTM D 3682 - 06
7	Na2O	%	3.02	ASTM D 3682 - 06
8	MnO2	%	0.05	ASTM D 3682 - 06
9	TiO2	%	0.85	ASTM D 3682 - 06
10	P2O5	%	0.36	ASTM D 2796 - 96
11	SO3	%	0.72	ASTM D 5016
12	Inherent Moisture (ADB)	%	1.8	ASTM D 3173 - 08
13	Ash content	%	70.83	ASTM D 3173 - 04
14	Lol	%	29.17	Gravimetric
15	Size Test			ASTM D 4749 - 07
	> 10 mm	%	0	
	0.5 - 10 mm	%	4.38	
	0 - 0.5 mm	%	95.62	