

HYdrogen Liquefaction & value chain Optimization Technologies (HYLOT)

## KENTECH HYLOT LAB WORKSHOP

### 2024 2<sup>nd</sup> HYLOT Lab Workshop

- 일시: 2024년 04월 27일 (토) ~ 04월 28일 (일)
- 장소 : 여수 노을과 바다 펜션
- 주제 : I. HYLOT (지도교수)
  - Ⅱ. 연구실 내규 및 보안 (지도교수)
  - III. 2024년 연구원 16인 개인별 소개 (지도교수 + 개인)
  - IV. 2024년 연구 목표 및 연구팀 (지도교수)
  - V. 2024년 논문 연구 (팀별 논문 주제 소개, 지도교수)
  - VI. 2024년 연구 과제 (프로젝트 소개 및 연구원 배정, 지도교수)
  - VII. 2024년 국내외 학회 연구 결과 발표 (지도교수)
  - VIII. 자유 토론 (<mark>전체</mark>)
  - IX. 팀워크 게임 (이선아 + 김수홍)



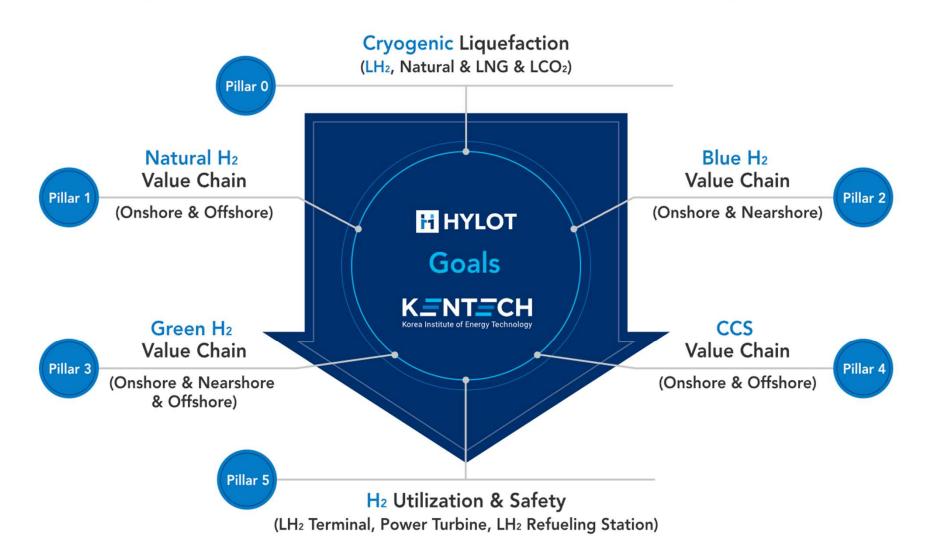
# I. HYLOT



## **HYLOT Goals**

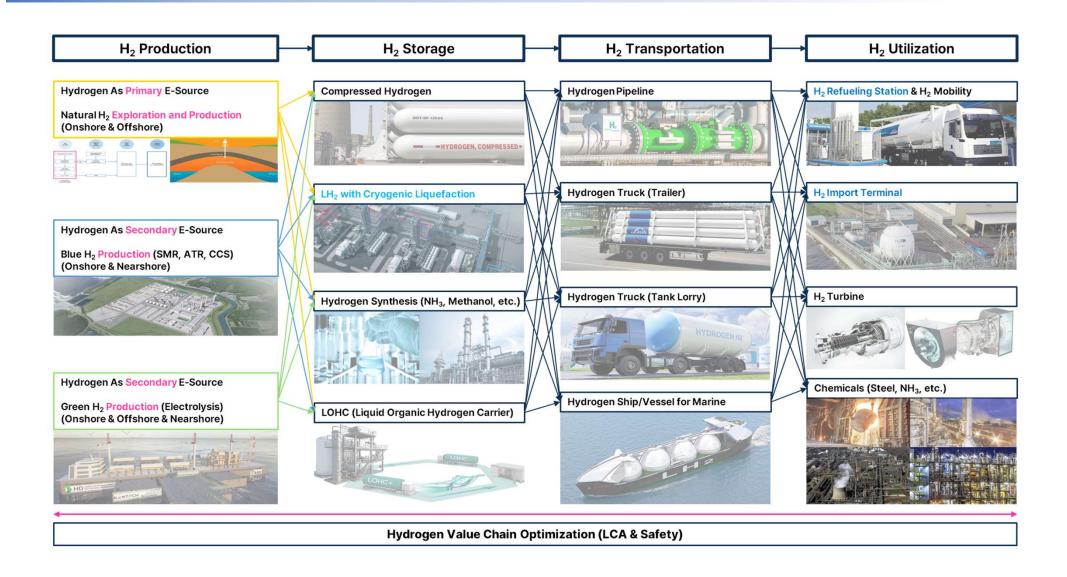


# World Leading R&D Lab for HYdrogen Liquefaction & Value Chain Optimization Technologies(HYLOT)



## **HYLOT Value Position**





## **HYLOT Researchers**







### Cryogenic Liquefaction Team / Natural Hydrogen Team

### Yesom Yun

- Email yesomy@kentech.ac.kr
- Contribution to the HYLOT
- 1. Cryogenic Liquefaction Technology Development, Natural Hydrogen Value Chain Development
- Life Motto

If it seems not bad, just begin. It becomes a valuable experience regardless of success or failure.

CV



**Cryogenic Liquefaction Team** 

### Alexander Alekseev

- Email Alexander.Alekseev@linde.com
- Contribution to the HYLOT
- 1. Nearshore hydrogen production & liquefaction platform development
- 2. Cryogenic liquefaction process technology development
- Research Interest

Hydrogen & LNG technology development

# Ⅱ. 2024년 연구실 내규 및 보안



## 연구실 내규 – 연구원 등급제



### HYLOT 연구원 등급제

등급	자격	조건		의무		권리
천연 (Natural)	✓ 대학원	-	<b>√</b>	연구 및 논문 주 5일 연구실 근무 (필요시 유연 근무 가능) 연구 과제 수행 (보안 유지 과제 수행)		해외 공동 연구 및 해외 중장기 파견 연구 SCI 논문 1저자 국내외 학회 출장 국내외 과제 출장 국내외 교육 출장 개인 자리 배석 연구수당 지급 개인별 미래 커리어 맞춤형 책임 지도 워크숍 및 연구실 이벤트, 회식 졸업 후 Alumni 등록 및 Life Cycle Care
그린 (Green)	기존 멤	k 3 학년 HYLOT	<b>√</b>	연구 및 논문 주 3일 연구실 근무 (필요시 유연 근무 가능) 연구 과제 수행 (보안 유지 과제 수행)		SCI 논문 1저자 국내외 학회 출장 국내외 과제 출장 국내외 교육 출장 개인 자리 배석 워크숍 및 연구실 이벤트, 회식
블루 (Blue)				자율 근무 (기숙사 및 희망하는 장소에서 자율 근무가능) 연구 과제 수행 (비보안 유지 과제 수행)	✓ ✓ ✓	국내 학회 출장 국내 과제 출장 워크숍 및 연구실 이벤트, 회식 자유롭게 타연구실 이동 가능
그레이 (Gray)		· —	✓	자율 근무 (기숙사 및 희망하는 장소에서 자율 근무가능) 관심 분야 공부 및 희망 시 가볍게 연구 과제 자료 조사 수 행 (비보안 유지 과제 수행)	<ul><li>✓</li><li>✓</li></ul>	국내 과제 출장 워크숍 및 연구실 이벤트, 회식 자유롭게 타연구실 이동 가능

- 상기 등급제로 인해 학부 1학년 연구생 수를 제한하지 않음 (단, 연구실 연구원 총원이 20명을 초과하지 않음)
- 그린 등급의 경우 의무 사항 3회 위반 또는 소홀 시 블루 등급으로 강등
- 지도 교수 및 행정 선생님이 의무 사항 점검 및 관리

## 연구실 내규 – 연구실 의무 사항



- 서로 간에 항상 존중하는 마음 가질 것
- 주간 / 격주 연구 관련 미팅 : 매주 수요일 (그린 등급 이상 참석)
  - ▶ 대학원생 : 오전 시간 대
  - ▶ 학부생 : 오후 시간 대 (격주로 진행)
  - ▶ 지도교수 개인별 미팅 시간은 연구원 개인별로 컨텍
- 월간 연구 관련 미팅: 매월 마지막주 수요일 (연구원 전원 참석)
  - ▶ 한달 동안 진행했던 논문 연구 및 연구 과제 공유 시간
  - ▶ 오후 2~6시 까지 오후 시간대 전체
  - ▶ 미팅 후 연구실 회식
- 분기별 워크숍: 매분기 금-토요일 또는 토-일요일 (연구원 전원 참석)
  - ▶ 분기별 연구 성과 공유 및 팀빌딩
  - ▶ 일정 및 장소는 다수결로 정함
  - ▶ 원구원들 중 1명과 장하련 선생님께서 담당



## 연구실 내규 – 연구실 권리 사항



- 논문 연구 및 연구 과제를 진행함에 있어 지도교수의 전적인 지원을 받을 수 있음
- 등급제에 따른 국내외 교육 / 학회 / 과제 출장
- 국외 출장의 경우 개인별 논문 투고 결과에 따라 신청 및 연구실 지원으로 나갈 수 있음
- SCI 급 저널 1저자 논문 성과에 대해서는 아래와 같은 추가 권리 사항
  - ▶ 대학원생 : 지도 교수 재량 내 연말 연구 수당 책정에 고려 / 연구실 지원으로 해외 학회 & 교육 출장
  - ▶ 학부생 : 방학 기간 중 연구실 지원으로 해외 교육 출장 / 대학원 진학 시 연구 실적으로 미리 인정으로 인한 학위 과정 단축
- 미래 커리어에 따른 맞춤형 지원
  - ▶ 대학원생 : 대학원 시작 또는 1학년 마치는 시점에 미래 커리어 (대학/정출연/해외취업/국내취업/창업 등) 를 결정하고 이에 맞춰 연구 및 교육 진행
  - ▶ 학부생 : 3학년 시작되는 시점에 대학원 진행 여부를 결정하고 이에 맞춰 연구 및 교육 진행 / 4학년 시점에는 HYLOT 연구실 대학원 진학 예정인 학부생들로만 연구 및 교육 진행

## 연구실 내규 – 학부 연구원 규정



### HYLOT 학부 연구원 규정



### HYLOT 학부연구생 매뉴얼

초안 제작: 학부 2기 한서진 초안 감수: 학부 2기 김여원, 유수현, 이인우, 이현화, 정민기, 최윤정, 한서진

- 기본적으로 상기 학부 연구원 규정이 Bible 임
- 연구원 등급제 내용 반영 후 개정 예정

## 연구실 보안 – 연구실 서버 구축 및 보안 등급



- 연구실 서버 관리자 : 김준석 대학원생
- 기본적인 논문 연구 및 과제 수행은 연구실 서버 폴더에 접속해서 진행
  - ▶ 논문 연구 폴더 : 연구원 등급제에 따른 논문 주제 배정
  - ▶ 연구 과제 폴더 : 연구원 등급에 따른 연구 과제 배정
- 서버 폴더 별 아래와 같이 보안 등급 부여
  - ▶ 무탄소 등급 : 지도교수만 접속 가능 폴더들
  - ▶ 천연 등급 : 대학원생 이상 등급 접속 가능 폴더들
  - 그린 등급 : 연구실 예비 대학원생 이상 등급 접속 가능 폴더들
  - ▶ 블루 등급 : 학부 2,3학년 이상 등급 접속 가능 폴더들
  - ▶ 그레이 등급 : HYLOT 연구실 모든 연구원들 접속 가능 폴더들
- 그린 등급 이상은 수행 논문 연구 및 연구 과제 성격에 따라 연구실 자체 보안 서약서 작성 및 서명
- 연구실 서버 사용법 : 김준석 대학원생



# III. 2024년 연구원 16인 개인별 소개



## HYLOT 연구원 – 대학원생





#### Cryogenic Liquefaction Team / Green Hydrogen Team

#### Yuree Byun

- Email Yureb2000@kentech.ac.kr
- Contribution to the HYLO
- 1. Gastech 2023 paper preparation, Nearshore hydrogen production and liquefaction platform development
- 2. Liquid hydrogen refueling station technology and standard development.
- Dosnarch Interes

Hydrogen liquefaction optimization, Process exergy analysis, LCA

Life Mott

A journey of a thousand miles begins with a single step.

CV



### Cryogenic Liquefaction Team / Natural Hydrogen Team

#### **Junseok Kim**

- Email junseokkim@kentech.ac.kr
- Contribution to the HYLOT
- 1. Development of natural hydrogen liquefaction process technology
- Research Intere

H<sub>2</sub> Value Chain Technologies (Blue H<sub>2</sub> (SMR + CCUS)), LH<sub>2</sub> Liquefier Technologies

Life Mot

The regret after not doing something is far bigger than that of doing something.

CV



Cryogenic Liquefaction Team / Natural Hydrogen Team

#### Yesom Yun

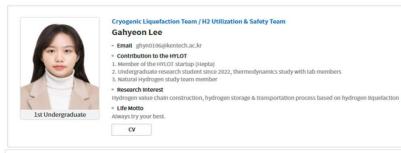
- Email yesomy@kentech.ac.kr
- Contribution to the HYLOT
- 1. Cryogenic Liquefaction Technology Development, Natural Hydrogen Value Chain Development
- Life Mott

If it seems not bad, just begin. It becomes a valuable experience regardless of success or failure.

CI

## HYLOT 연구원 - 학부 3학년 (켄텍 1기)







#### Cryogenic Liquefaction Team / Blue Hydrogen Team

#### Seoyeon Yu

- Email westkite62@kentech.ac.kr
- Contribution to the HYLOT
- Gastech 2023 thesis contributor
- 2. white hydrogen thesis research
- Research Interest
- Blue H2
- Life Motto
- in for a penny, in for a pound.

CV



Cryogenic Liquefaction Team / Blue Hydrogen Team

### Seona Lee

- Email seonarayo@kentech.ac.kr
- Contribution to the HYLOT
- 1. CCUS technology paper review and thermodynamics group study

### Research Interest

blue hydrogen and CCS technology

Life Motto

Don't look back.

CV



Cryogenic Liquefaction Team / Blue Hydrogen Team / H2 Utilization Team

#### **Suhong Kim**

- Email tnghd3207@kentech.ac.kr
- Contribution to the HYLOT

1. 2022 HRS (Hydrogen Refueling Station) current installation status research, CCUS technology paper review (Thermodynamics study with lab members)

#### Research Interes

Hydrogen liquefaction process design from thermodynamic theories to practical applications, Liquid hydrogen application on various disciplines, Carbon capture technologies in chemical ways such as amine absorption and its process design

#### Life Motto

Work hard, play hard!

## HYLOT 연구원 - 학부 2학년 (켄텍 2기)





#### Cryogenic Liquefaction Team / CCS Team

#### Hyunhwa Lee

- Email Ihhjsjs@kentech.ac.kr
- · Contribution to the HYLOT
- 1. Onboard Carbon Capture Technology with KRISO

Carbon Capture/Utilization/Storage Technology, Blue Hydrogen, Green Hydrogen, Hydrogen Liquefaction Process,

When life gives you lemons, make the lemonade.

Cryogenic Liquefaction Team / CCS Team

CV



Minki Jung

- Email jmk8643@kentech.ac.kr
- Contribution to the HYLOT
- 1. Onboard Carbon Capture Technology with KRISO

Carbon Capture/Utilization/Storage Technology, Green Hydrogen, Fuel cell, Hydrogen Liquefaction Process

With great power comes great responsibility.



Cryogenic Liquefaction Team / H2 Utilization & Safety Team

- Email hsjskwn2@kentech.ac.kr
- 1. LHRS Project with KOGAS-tech (NRF Natural Hydrogen Project with KNOC)
- 2. Hepta IR English ver. Translation
- 3. SK E&S Special Lecture Slides Creation
- 4.5th Hydrogen Energy Get-it-right National Contest Grand Prize (1st Place) on Hydrogen Policy
- 5, 2023 Fall Academic Conference in Jeju Presentation on Korean LHRS
- 6. FCEE 2024 The First Undergraduate Student in KENTECH to be the 1st Author

Hydrogen/Cryogenic Liquefaction Process, Hydrogen Infrastructure, LHRS, Blue Hydrogen, Natural Hydrogen, Integrated

If you light a lamp for somebody, it will also brighten your path.



2nd Undergraduate

#### Cryogenic Liquefaction Team / H2 Utilization & Safety Team

#### Suhyun Ryu

- Contribution to the HYLOT

1. Conducted a survey on hydrogen mobility, assessed the current status of liquefied hydrogen refueling stations, researched LNG liquefaction processes, explored hydrogen liquefaction processes, studied distributed modeling for ammonia co-firing power generation, and conducted research on the development and production status of components related to liquefied hydrogen.

Blue Hydrogen, Green Hydrogen, White Hydrogen, Hydrogen Liquefaction Processes, Carbon Capture, Utilization, and

 $Let's \ strive \ to \ experience \ a \ wide \ range \ of \ opportunities. \ Let's \ always \ do \ my \ best \ in \ everything \ l've \ been \ given.$ 

CV



### Cryogenic Liquefaction Team / H2 Utilization & Safety Team

#### Yeowon Kim

- · Contribution to the HYLOT
- 1. Researched the market size of materials, components, and equipment related to carbon-neutral power sources, assessed the technological prospects, economic implications, and examined the export status.
- 2. Presented a proposal for a carbon-neutral value chain utilizing by products from a compost plant in Naju at the 2023 1st ACCE (Association for Carbon-Neutral Circular Economy) International Conference.
- 3. Translated and organized the GB 50516-2010; Technical code for hydrogen fuelling station based on domestic engineering plant terminology. 4. Contributed to the Development of Technical Specifications and Process System Requirements for the World's Largest LH2 Refueling Station, submitting the respective paper to FCEE2024. Particularly, played a significant role in detailing the overall station process by unveiling the Process Flow Diagram (PFD) for the LHRS in Yeongdong and modeling the Operational Dynamics of the LHRS Process.

Hydrogen Liquefaction, Hydrogen Utilization, Carbon Neutrality

The path I tread is my life, and I walk upon it freely!

## HYLOT 연구원 - 학부 1학년 (켄텍 3기)





#### Cryogenic Liquefaction Team / Natural Hydrogen Team

#### **Chanhyeon Jeong**

- Email wcgken8514@kentech.ac.kr

All areas of the hydrogen value chain, but especially interested in natural hydrogen and storage & transportation area such as cryogenic hydrogen liquefaction, storage tank and import tank development. Hope to create a battery based on hydrogen.

With confidence, for the anticipated tomorrow

CV



### Cryogenic Liquefaction Team / Natural Hydrogen Team

#### Minchae Kang

- Email kangminchae@kentech.ac.kr
- Contribution to the HYLOT
- 1. Development of natural hydrogen liquefaction process technology

Hydrogen Industry, Hydrogen/Cryogenic Liquefaction, Hydrogen Infrastructure, LHRS, Blue Hydrogen, Natural Hydrogen, Integrated Process Design, LNG, Policy, Value Chain Optimization, Industry-academia Cooperation

Life Motto

The best way to predict the future is invent it



#### Cryogenic Liquefaction Team/ Blue Hydrogen

#### Saebom Kim

- Email sbkim@kentech.ac.kr
- Contribution to the HYLOT
- Blue hydrogen value chain technology development

Hydrogen Industry, Hydrogen/Crygenic Liquefaction, Hydrogen Infrastructure, Blue Hydrogen, Natural Hydrogen, Policy, Hydrogen Ship

#### Life Motto

I know not all that may be coming, but be it what it will, I'll go to it laughing



#### Cryogenic Liquefaction Team / Green Hydrogen Team

#### Jiwon Lee

- Email jwjw0802@kentech.ac.kr
- Contribution to the HYLOT

Green & Blue hydrogen value chain technology development

 $Hydrogen\ value\ chain, Hydrogen\ Industry, Blue\ hydrogen, CCUS\ technology, Natural\ hydrogen, Hydrogen\ Lique faction, Technology-related\ policies,$ Technology-related inter-national agreements

Only those who are prepared recognize opportunities

# IV. 2024년 연구 목표 및 연구팀



## 2024년 연구 목표



- ➤ 목표 1: 해외 유수 SCI 저널지 논문 게제 (총 10편 목표)
  - ✓ 2 full papers accepted, to be published
  - √ 1 full paper submitted
  - ✓ 5 abstracts submitted, Full papers to be prepared / published
  - √ 5 ~ 7 full papers to be submitted
- ▶ 목표 2: 국제공동 연구 과제 수행 (총 1개 대형 프로젝트 목표)
- 목표 3 : 산업체 연구 과제 수행 (총 5개 이상 프로젝트 목표)
- 목표 4 : 정부 연구 과제 수행 (총 3개 대형 프로젝트 목표)
- 목표 5 : 정출연 / 지자체 연구 과제 수행 (총 2개 프로젝트 목표)
- 목표 6: 해외 학회 연구 결과 발표 (총 5개 이상 학회 목표)
- 목표 7 : 국내 학회 연구 결과 발표 (총 3개 이상 학회 목표)





### Cryogenic Liquefaction Team



#### Cryogenic Liquefaction Team / Natural Hydrogen Team

#### Yesom Yun

- Email yesomy@kentech.ac.kr
- Contribution to the HYLOT
- 1. Cryogenic Liquefaction Technology Development, Natural Hydrogen Value Chain Development

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**Cryogenic Liquefaction Team** 

#### Alexander Alekseev

- Email Alexander.Alekseev@linde.com
- Contribution to the HYLOT
- 1. Nearshore hydrogen production & liquefaction platform development
- 2. Cryogenic liquefaction process technology development
- Research Interest

Hydrogen & LNG technology development



#### Cryogenic Liquefaction Team / Green Hydrogen Team

#### Fatma Yehia

- Email fatmayehia93@outlook.com
- Contribution to the HYLOT
- 1. SCI papers
- 2. Cryogenic liquefaction process technology development
- Research Interest

Hydrogen production & Liquefaction, LNG processes and optimization, Carbon Capture & Utilization & Storage (CCUS), Biomass & Biofuels & Waste to Energy



Cryogenic Liquefaction Team / H2 Utilization & Safety Team

### **Gahyeon Lee**

- Email ghyn0106@kentech.ac.kr
- Contribution to the HYLOT
- 1. Member of the HYLOT startup (Hepta)
- 2. Undergraduate research student since 2022, thermodynamics study with lab members
- 3. Natural Hydrogen study team member

Hydrogen value chain construction, hydrogen storage & transportation process based on hydrogen liquefaction

Always try your best.

CV



Cryogenic Liquefaction Team / H2 Utilization & Safety Team

#### **Jiwoon Song**

- Email thdwldns@snu.ac.kr
- Contribution to the HYLOT
- 2. Liquid hydrogen BOG (Boil-Off Gas) process development from LH2 storage tanks
- Research Interest

LH2/LNG Cryogenic Liquefaction Process Optimization, LH2 Tanks Design, Wind Turbine



Cryogenic Liquefaction Team / Blue Hydrogen Team / H2 Utilization Team

### Suhong Kim

- Email tnghd3207@kentech.ac.kr
- Contribution to the HYLOT

1. 2022 HRS (Hydrogen Refueling Station) current installation status research, CCUS technology paper review (Thermodynamics study with lab

 $Hydrogen\ lique faction\ process\ design\ from\ thermodynamic\ theories\ to\ practical\ applications,\ Liquid\ hydrogen\ application\ on\ various\ disciplines,$ Carbon capture technologies in chemical ways such as amine absorption and its process design

Work hard, play hard!



### Natural Hydrogen Team



#### Cryogenic Liquefaction Team / Natural Hydrogen Team

#### Junseok Kim

- · Email junseokkim@kentech.ac.kr
- Contribution to the HYLOT
- 1. Development of natural hydrogen liquefaction process technology

H2 Value Chain Technologies (Blue H2(SMR + CCUS)), LH2 Liquefier Technologies

Life Mott

The regret after not doing something is far bigger than that of doing something.

CV



Cryogenic Liquefaction Team / Natural Hydrogen Team

#### **Chanhyeon Jeong**

- Email wcgken8514@kentech.ac.kr
- Research Interes

All areas of the hydrogen value chain, but especially interested in natural hydrogen and storage & transportation area such as cryogenic hydrogen liquefaction, storage tank and import tank development. Hope to create a battery based on hydrogen.

#### · Life Motto

With confidence, for the anticipated tomorrow

CV



#### Cryogenic Liquefaction Team / Natural Hydrogen Team

#### Minchae Kang

- Email kangminchae@kentech.ac.kr
- Contribution to the HYLOT
- 1. Development of natural hydrogen liquefaction process technology

#### Posparch Interes

Hydrogen Industry, Hydrogen/Cryogenic Liquefaction, Hydrogen Infrastructure, LHRS, Blue Hydrogen, Natural Hydrogen, Integrated Process Design, LNG, Policy, Value Chain Optimization, Industry-academia Cooperation

#### Life Motto

The best way to predict the future is invent it

CV

### Green Hydrogen Team



Cryogenic Liquefaction Team / Green Hydrogen Team

#### Yuree Byun

- Email Yureb2000@kentech.ac.kr
- Contribution to the HYLOT
- 1. Gastech 2023 paper preparation, Nearshore hydrogen production and liquefaction platform development
- 2. Liquid hydrogen refueling station technology and standard development.

#### Research Interest

Hydrogen liquefaction optimization, Process exergy analysis, LCA

Life Motto

A journey of a thousand miles begins with a single step.

CV



### Cryogenic Liquefaction Team / Green Hydrogen Team

### Jiwon Lee

- Email jwjw0802@kentech.ac.kr
- Contribution to the HYLOT

Green & Blue hydrogen value chain technology development

#### Research Interes

Hydrogen value chain, Hydrogen Industry, Blue hydrogen, CCUS technology, Natural hydrogen, Hydrogen Liquefaction, Technology-related policies, Technology-related inter-national agreements

#### Life Mott

Only those who are prepared recognize opportunities



### Blue Hydrogen Team



Cryogenic Liquefaction Team / Blue Hydrogen Team

#### Seona Lee

• Email seonarayo@kentech.ac.kr

- · Contribution to the HYLOT
- 1. CCUS technology paper review and thermodynamics group study
- Research Interest

blue hydrogen and CCS technology

Life Motto

Don't look back.



Cryogenic Liquefaction Team / Blue Hydrogen Team

#### Seoyeon Yu

- Email westkite62@kentech.ac.kr
- Contribution to the HYLOT
- 1. Gastech 2023 thesis contributor
- 2. white hydrogen thesis research
- Research Interest Blue H2
- Life Motto

in for a penny, in for a pound.



Cryogenic Liquefaction Team/ Blue Hydrogen

#### Saebom Kim

- Email sbkim@kentech.ac.kr
- Contribution to the HYLOT

Blue hydrogen value chain technology development

- Hydrogen Industry, Hydrogen/Crygenic Liquefaction, Hydrogen Infrastructure, Blue Hydrogen, Natural Hydrogen, Policy, Hydrogen Ship

I know not all that may be coming, but be it what it will, I'll go to it laughing

### CCS Team



Cryogenic Liquefaction Team / CCS Team

### Hyunhwa Lee

- Email Ihhjsjs@kentech.ac.kr
- Contribution to the HYLOT
- 1. Onboard Carbon Capture Technology with KRISO

Carbon Capture/Utilization/Storage Technology, Blue Hydrogen, Green Hydrogen, Hydrogen Liquefaction Process, Hydrogen Cycle Process

Life Motto

When life gives you lemons, make the lemonade.

CV



Cryogenic Liquefaction Team / CCS Team

#### Minki Jung

- Email jmk8643@kentech.ac.kr
- Contribution to the HYLOT
- 1. Onboard Carbon Capture Technology with KRISO

Carbon Capture/Utilization/Storage Technology, Green Hydrogen, Fuel cell, Hydrogen Liquefaction Process

With great power comes great responsibility.



### Hydrogen Utilization Team



### Cryogenic Liquefaction Team / H2 Utilization & Safety Team

#### Seojin Han

- Email hsjskwn2@kentech.ac.kr
- Contribution to the HYLOT
- 1. LHRS Project with KOGAS-tech (NRF Natural Hydrogen Project with KNOC)
- 2. Hepta IR English ver. Translation
- 3. SK E&S Special Lecture Slides Creation
- 4. 5th Hydrogen Energy Get-it-right National Contest Grand Prize (1st Place) on Hydrogen Policy
- 5. 2023 Fall Academic Conference in Jeju Presentation on Korean LHRS
- 6. FCEE 2024 The First Undergraduate Student in KENTECH to be the 1st Author

Hydrogen/Cryogenic Liquefaction Process, Hydrogen Infrastructure, LHRS, Blue Hydrogen, Natural Hydrogen, Integrated Process Design, LNG, Policy, Value Chain Optimization, Industry-academia Cooperation

If you light a lamp for somebody, it will also brighten your path.

CV



2nd Undergraduate

### Cryogenic Liquefaction Team / H2 Utilization & Safety Team

#### Suhyun Ryu

- Email mellon777@kentech.ac.kr
- · Contribution to the HYLOT
- 1. Conducted a survey on hydrogen mobility, assessed the current status of liquefied hydrogen refueling stations, researched LNG liquefaction processes, explored hydrogen liquefaction processes, studied distributed modeling for ammonia co-firing power generation, and conducted research on the development and production status of components related to liquefied hydrogen.

Blue Hydrogen, Green Hydrogen, White Hydrogen, Hydrogen Liquefaction Processes, Carbon Capture, Utilization, and Storage (CCUS).

Let's strive to experience a wide range of opportunities. Let's always do my best in everything I've been given.

CV



### Cryogenic Liquefaction Team / H2 Utilization & Safety Team

#### Yeowon Kim

- · Email ywkimb@kentech.ac.kr
- Contribution to the HYLOT
- 1. Researched the market size of materials, components, and equipment related to carbon-neutral power sources, assessed the technological prospects, economic implications, and examined the export status.
- 2. Presented a proposal for a carbon-neutral value chain utilizing by products from a compost plant in Naju at the 2023 1st ACCE (Association for Carbon-Neutral Circular Economy) International Conference.
- 3. Translated and organized the GB 50516-2010; Technical code for hydrogen fuelling station based on domestic engineering plant terminology.
- 4. Contributed to the Development of Technical Specifications and Process System Requirements for the World's Largest LH2 Refueling Station, submitting the respective paper to FCEE2024. Particularly, played a significant role in detailing the overall station process by unveiling the Process Flow Diagram (PFD) for the LHRS in Yeongdong and modeling the Operational Dynamics of the LHRS Process.

#### Research Interest

Hydrogen Liquefaction, Hydrogen Utilization, Carbon Neutrality

The path I tread is my life, and I walk upon it freely!

# V. 2024년 논문 연구



## 그린 수소 연구팀



SCI Subject 1: Nearshore Green Hydrogen Production & Liquefaction Platform – Exergy and Economic Analysis



#### Cryogenic Liquefaction Team / Green Hydrogen Team

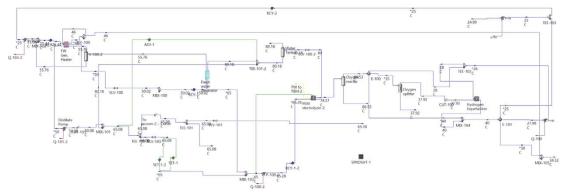
### Yuree Byun

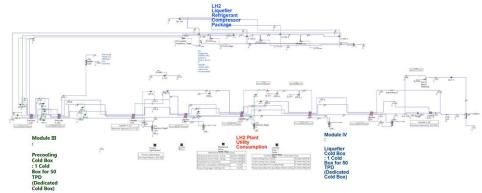
- Email Yureb2000@kentech.ac.kr
- Contribution to the HYLOT
- Gastech 2023 paper preparation, Nearshore hydrogen production and liquefaction platform development
   Liquid hydrogen refueling station technology and standard development.
- Research Interest
- Hydrogen liquefaction optimization, Process exergy analysis, LCA
- Life Mott

A journey of a thousand miles begins with a single step.

CV







수전해 시스템

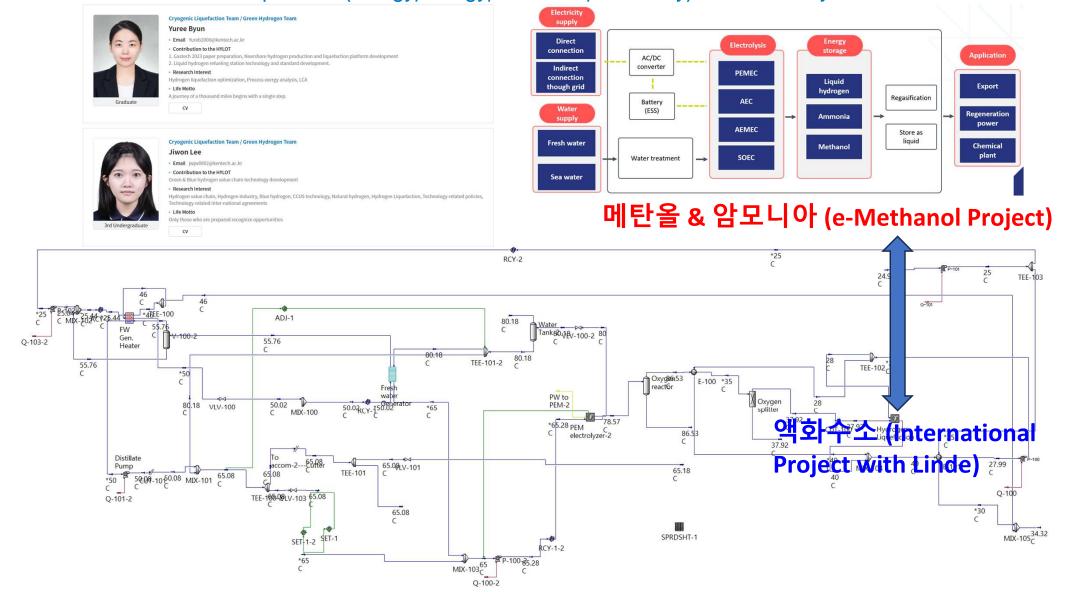


수소액화 시스템

## 그린 수소 연구팀



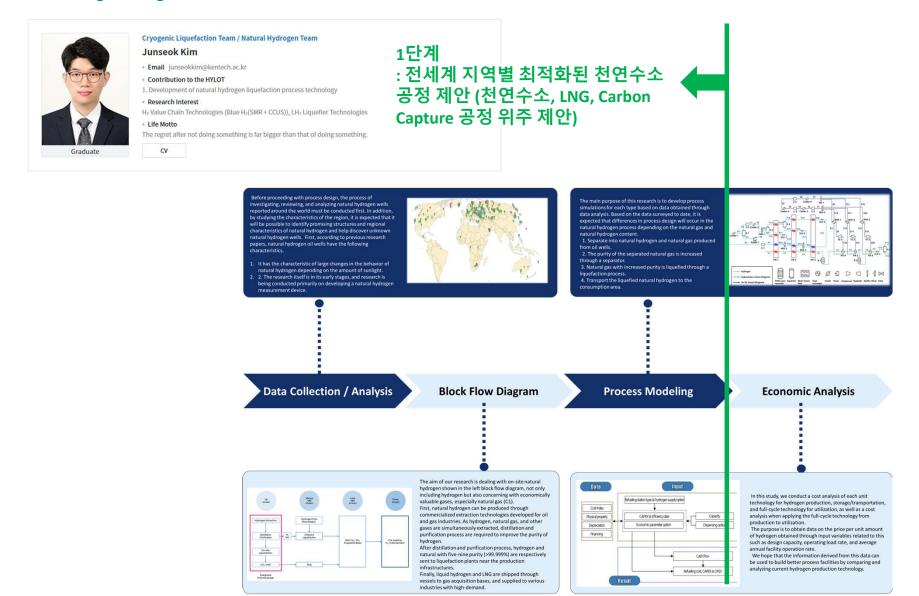
 SCI Subject 2: Value Chain Analysis on Nearshore Green Hydrogen Production & Liquefaction Platform - 4 E Perspectives (Energy, Exergy, Economic, Efficiency) and LCA Analysis



## 천연 수소 연구팀



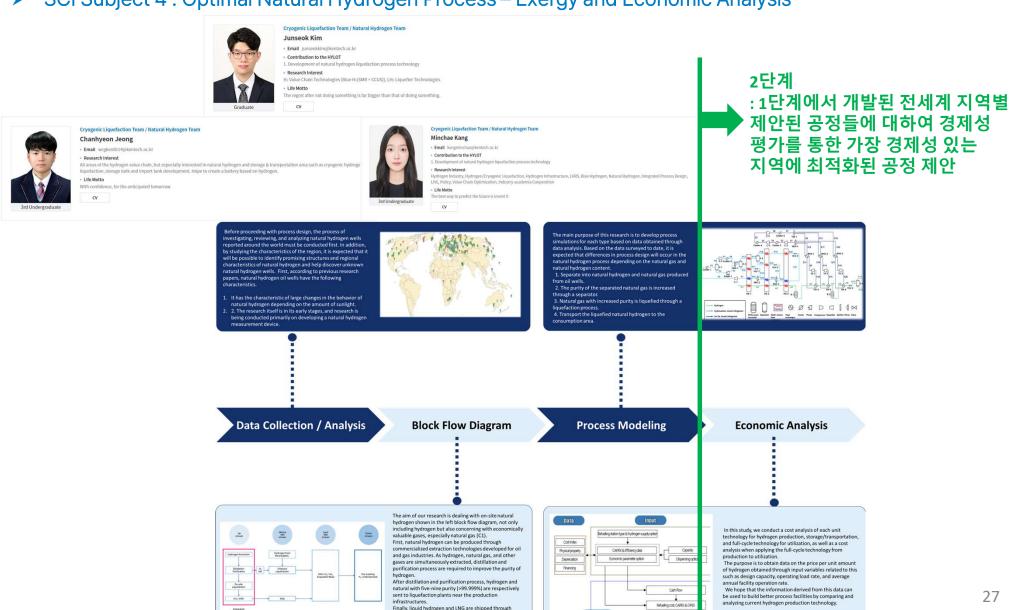
SCI Subject 3 : Development of Field Specific / General Natural Hydrogen Processes through analysis of global gas reservoirs



## 천연 수소 연구팀



SCI Subject 4: Optimal Natural Hydrogen Process – Exergy and Economic Analysis



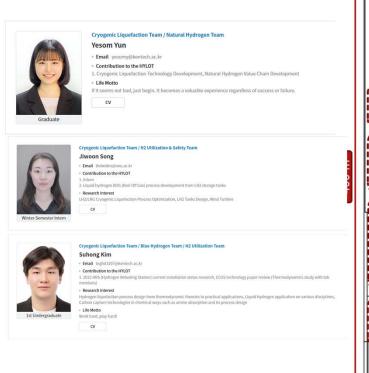
vessels to gas acquisition bases, and supplied to various

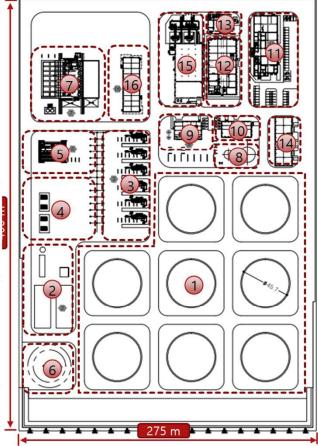
industries with high-demand.



> SCI Subject 5: BOG Life Cycle Analysis and BOG liquefaction process development for LH2 import

terminal infrastructure





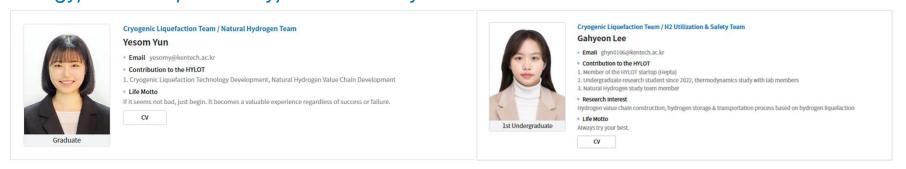
NO.	Description
1	LH2 Storage Tank Area
2	BOG liquefaction system
3	Vaporizer System
4	Refrigeration System
5	Send-out System
6	Flare system
7	Sea Water Intake System
8	Industrial & Potable Water System
9	Air Compressor Room
10	Fire Fighting System
11	Admin. BLDG
12	Maintenance House
13	Laboratory Building
14	Warehouse
15	Main Station
16	Sub Station

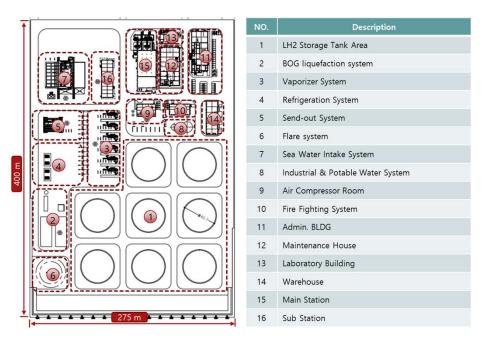






SCI Subject 6: Value Chain Analysis on LH2 import terminal infrastructure - 4 E Perspectives (Energy, Exergy, Economic, Efficiency) and LCA Analysis





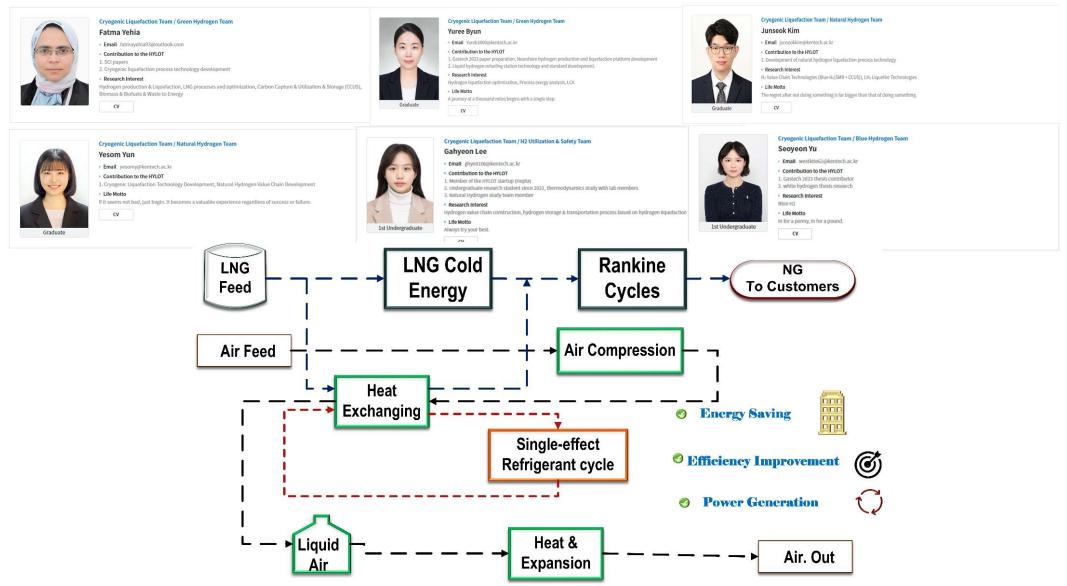


액화수소 도입 터미널

암모니아 도입 터미널



> SCI Subject 7: Integration of the Single-Effect Mixed Refrigerant Cycle with Liquified Air Storage Energy and Cold Energy of LNG Regasification: Energy, Exergy, and Efficiency Prospectives (Submitted to Energy)





SCI Subject 8 : Comprehensive State of the Art on Hydrogen Liquefaction Processes: 4E Perspectives and Analysis – Energy, Exergy, Economic, and Efficiency



### Cryogenic Liquefaction Team / Green Hydrogen Team

• Email fatmayehia93@outlook.com

- Contribution to the HYLOT

2. Cryogenic liquefaction process technology development

Hydrogen production & Liquefaction, LNG processes and optimization, Carbon Capture & Utilization & Storage (CCUS), Biomass & Biofuels & Waste to Energy



Cryogenic Liquefaction Team / Green Hydrogen Team

Yuree Byun

• Fmail Yurob2000@kentech ac kr

Contribution to the HYLOT

2. Liquid hydrogen refueling station technology and standard development.

cv



#### Cryogenic Liquefaction Team / Natural Hydrogen Team

• Email junseokkim@kentech.ac.kr

1. Development of natural hydrogen liquefaction process technology

Research Interest

Hz Value Chain Technologies (Blue Hz (SMR + CCUS)), LHz Liquefier Technologies

The regret after not doing something is far bigger than that of doing something.



### Cryogenic Liquefaction Team / Natural Hydrogen Team

#### Yesom Yun

Email yesomy@kentech.ac.kr

1. Cryogenic Liquefaction Technology Development, Natural Hydrogen Value Chain Development

If it seems not bad, just begin. It becomes a valuable experience regardless of success or failure.

CV



Cryogenic Liquefaction Team / Blue Hydrogen Team / H2 Utilization Team

Email tnehd3207@kentech.ac.kr

Contribution to the HYLOT

1. 2022 HRS (Hydrogen Refueling Station) of

Carbon capture technologies in chemical ways such as amine absorption and its process design

Work hard, play hard!

CV



### Cryogenic Liquefaction Team / Blue Hydrogen Team

Seona Lee

Contribution to the HYLOT

1. CCUS technology paper review and thermodynamics group study

blue hydrogen and CCS technology

Don't look back

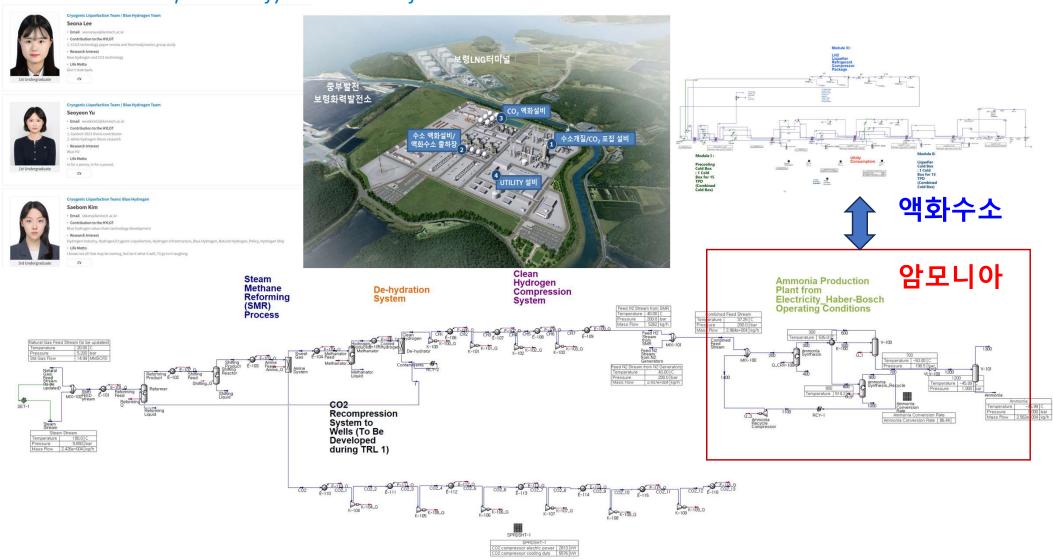
LH	2 Simulation		Unit Operation	Exergy Loss	Percent%
Unit operations	Net Exergy	Percent %	LH2 Liquefier Compressor_Stage 1	286.78	3.2%
Compressors	1133.67	12.78%	LH2 Liquefier Compressor_Stage 2	234.10	2.6%
Expanders	276.85	3.12%	LH2 Liquefier Compressor_Stage 3	304.42	3.4%
Reactors	451.37	5.09%	LH2 Liquefier Compressor_Stage 4	308.37	3.5%
LNG Heat Exchangers	5960.08	67.19%	Liquefier Expander_1	95.52	1.1%
Coolers	1048.3	11.82%	Liquefier Expander_2	109.23	1.2%
Total	8870.312869	100.00%	Liquefier Expander_3	72.10	0.8%
			o-p Reaction_Stage1	186.57	2.1%
			o-p Reaction_Stage 2	63.94	0.7%
			o-p Reaction_Stage 3	83.57	0.9%
			o-p Reaction_Stage 4	91.44	1.0%
Net Exergy Inlet			o-p Reaction_Stage 5	25.86	0.3%
Total Power of Co	mpressors	9838.36	Precooler 1_LN2	1035.27	11.7%
Hydrogen Feed	Exergy	3960.55	Precooler 2_LN2	1769.82	20.0%
N2 Feed Ex	ergy	749.52	Liquefier 1_H2	178.14	2.0%
Net Exergy Outlet			Liquefier 2_H2	185.69	2.1%
Total Power of Turbines		227.69	Liquefier 3_H2	1197.85	13.5%
Hydrogen Exergy		12133.64	Liquefier 4_H2	1279.74	14.4%
N2 Out Exergy		982.50	Liquefier 5_H2	313.57	3.5%
Exergy Net Destruction		21986.4529	LH2 Cooler_1	540.29	6.1%
Total Exergy Inlet		14548.43	LH2 Cooler_2	23.16	0.3%
Total Exergy Outlet		13343.8330	LH2 Cooler_3	241.49	2.7%
η		55.7%	LH2 Cooler_4	243.39	2.7%
21		1204.60	TOTAL	8870.312869	100.000%

		Summary of overall cost		
Overall Cos	t Estimation			
otal Captial Cost	\$ 38,232,786.66			
Compressors	\$ 13,977.21	Total Captial Cost	S	38,232,786.66
urbines	\$ 1,146.45	Annual operating Cost	\$	8,747.10
NG Heat Exchangers	\$ 38,216,525.67	Maintance cost	S	1,023.32
Reactors	\$ 1,032.25	Labor cost	\$	153.50
Vater Coolers	\$ 105.07	Annual sales	5	51,503.43
innual operating Cost	S 8,747.10	Net Present Value	S	(12,989,994.61)
lectricity Comsumption cost	\$ 6,934.10	Annualized cost (KS)	S	325,506,012.51
Cooling Cost	S 124.53	Unit production cost per year(k5)	5	6,374.39
faintance cost	\$ 1,023.32			
abor cost	S 153.50			
ther costs	\$ 511.66			
innual sales	\$ 51,503.43			
ctricity sales	\$ 438.81			
iquid Hydrogen Sales	\$ 51,064.62			
innualized Value	\$ (1,525,799.89)			
RR (%)	\$ (0.07)			
BP (yr)	S -			
et Present Value				
aily average	\$ (12,989,994.61)			
Cost Recovery Factor	0.117459625			
nnualized cost (K\$)	\$ 325,506,012.51			
nit production cost per year(k\$)	\$ 6,374.39			

## 블루 수소 연구팀



➤ SCI Subject 9 : Blue Hydrogen Production Value Chain Analysis – 4 E Perspectives (Energy, Exergy, Economic, Efficiency) and LCA Analysis

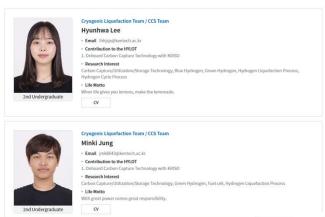


## CCS 연구팀



SCI Subject 10: Integrated process development for Onboard CCS – 4 E Perspectives (Energy,

Exergy, Economic, Efficiency)



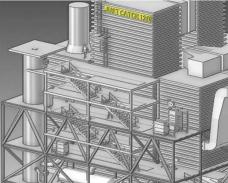
**PROMAX** 

simulation

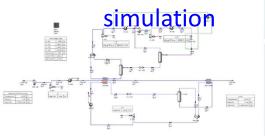


#### All of our training courses are provided at no charge.

#### BRE 236: Carbon Capture & Storage

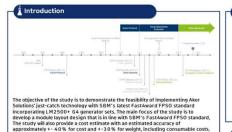


### **HYSYS**



### Onboard CCS in HYLOT K=NT=CH Inwoo Lee, Hyunhwa Lee, Minki Jung 2023 KENTECH ANNUAL RESEARCH FAIR

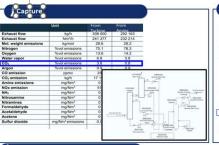




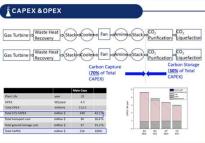


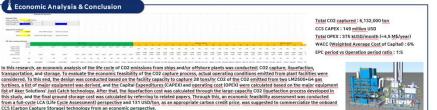






CCS (Carbon Capture Storage) technology from an economic perspective





# Hydrogen Utilization 연구팀

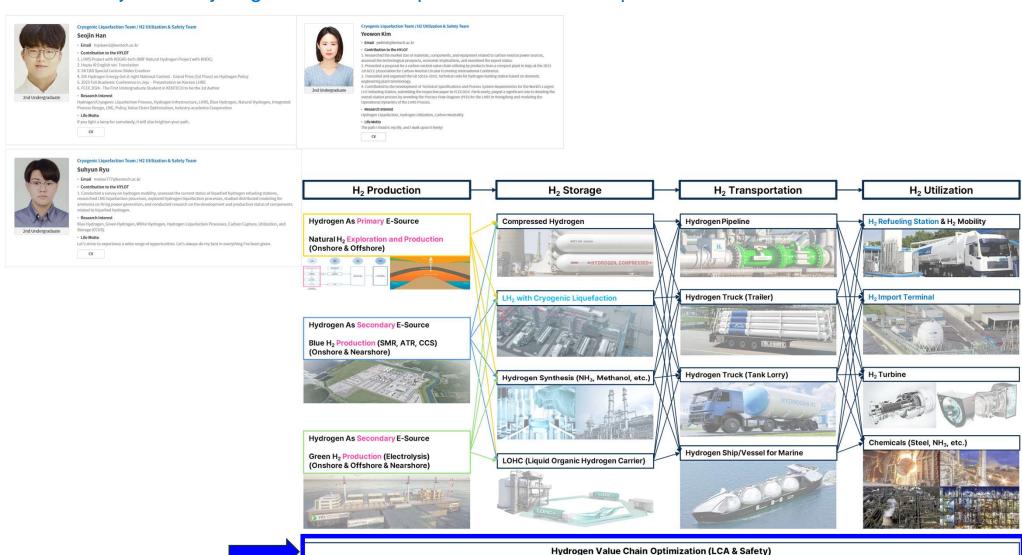


SCI Subject 11: LH2 refueling station process development – 4 E Perspectives (Energy, Exergy, Economic, Efficiency) Cryogenic Liquefaction Team / H2 Utilization & Safety Team Yeowon Kim Seojin Han 80평 3.000ka 범용 충전량: 900kg/일 압축기(6x3.4x3.5m) Research Interest 압축수소 충전소 Suhyun Ryu Contribution to the HYLOT (12m x25mx25) 사용가능:100~200kg 3 404 C T859.4 bar 10 3.404 C 7-2 \*-250 22 3.404 C RCY-2 C \*2.5 T2539.4 bar DIG-100 859.4 bar 3.404 C 3.404 C FCV422 Boil-off VLV-101 Gas\_ -251.1 FCV-301A Q-104 3.404 859.5 bar bar Q-102 -175.6 HEX-440AA \*-187.3 \*-110.3 HEX-440AB \*3.4 TEE-103 FCV-301B 3.404 PC-101B \*860.3 859.5 859.4 5-2 -250 VLV-103 -51.67 V-104 -41.6 859.8 12-2 12 -43.65 ban 1A 12-1 4-2 -250 TEE-100 Tank\_to\_Pump 7 -250 C MIX-100 3.4 bar -249.3 T-500-O-CC \*8.6 \*-41.6 C MIX-102 \*3.5 bar To\_HP -249.3 14 T-500-I Q-101 T-500-O-Disp MIX-101 TEE-106 \*8 9 har -31.92 2 -175.6 AOV-311 3.7 bar 860.3

## Hydrogen Utilization 연구팀



➤ SCI Subject 12 : Hydrogen Value Chain Optimization – LCA Perspectives



## Hydrogen Utilization 연구팀



SCI Subject 13 : Power Generation Model Development - CHPS (Clean Hydrogen Portfolio Standard) Perspectives





SCI Subject 14: The Most Economical Option for Hydrogen Production with Nearshore Hydrogen Production Platform (Accepted to OTC, to be published)



Cryogenic Liquefaction Team / Green Hydrogen Team

#### Yuree Byun

- Email Yureb2000@kentech.ac.kr
- . Contribution to the HYLOT
- 1. Gastech 2023 paper preparation, Nearshore hydrogen production and liquefaction platform development
- 2. Liquid hydrogen refueling station technology and standard development
- Research Interest
- Hydrogen liquefaction optimization, Process exergy analysis, LCA
- Life Motto
- A journey of a thousand miles begins with a single step.

CV



Cryogenic Liquefaction Team / H2 Utilization & Safety Team

#### **Gahyeon Lee**

- · Email ghyn0106@kentech.ac.kr
- Contribution to the HYLOT
- 1. Member of the HYLOT startup (Hepta)
- $2.\,Undergraduate\,research\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,lab\,members\,student\,since\,2022,\,thermodynamics\,study\,with\,since\,2022,\,thermody$
- 3. Natural Hydrogen study team membe
- Research Interest
- Hydrogen value chain construction, hydrogen storage & transportation process based on hydrogen liquefaction
- Life Motto

Always try your best

CV



Cryogenic Liquefaction Team / Blue Hydrogen Team

#### Seoyeon Yu

- Email westkite62@kentech.ac.kr
- Contribution to the HYLOT
- 1. Gastech 2023 thesis contributor
- 2. white hydrogen thesis research
- Research Interest
- Blue H2
- Life Motto

in for a penny, in for a pound

CV

Ocean Technology Conference 2024 (OTC 2024)

OTC-35430-MS

# The Most Economical Option for Hydrogen Production with Nearshore Hydrogen Production Platform

J. Hwang<sup>2\*</sup>, Y. Youn<sup>1</sup>, S. Park<sup>1</sup>, J. Nam<sup>1</sup>, Y. Byun<sup>2</sup>, S. Yu<sup>2</sup>, G. Lee<sup>2</sup>, A. Alekseev<sup>3</sup>, V. Göke<sup>3</sup>, Y. Kim<sup>3</sup>, K. Lange<sup>4</sup>, S. Kühner<sup>4</sup>, K. Ilse<sup>4</sup>, H. Jeon<sup>5</sup>

<sup>1</sup>HD Korea Shipbuilding & Offshore Engineering, Seongnam-si, Gyeonggi-do, Republic of Korea

<sup>2</sup>Korea Institute of Energy Technology, Naju-si, Jeollanam-do, Republic of Korea

3Linde, Pullach, Germany

<sup>4</sup>Fraunhofer, Frankfurt, Germany

<sup>5</sup>ABS Korea, Busan, Republic of Korea

\*Presenter

#### Abstract

Hydrogen production using renewable power is becoming an essential pillar for future sustainable energy sector development worldwide. However, this way to produce green hydrogen is much expensive than traditional generation of hydrogen from fossil fuel called as gray hydrogen, so we need to identify effective pathways to lower this cost. Costs are currently driven by the price of renewable electricity and CAPEX to make hydrogen such as electrolyzers, but these prices are falling with more research and commercialization.

Most of energy consumers who use fossil fuels turns to electricity user to reduce CO2 emission. The electricity will be produced from renewable source such as solar, wind power, hydro power, etc. However, some industries including shipping and aviation cannot use electricity directly, because of energy density of batteries. Therefore, the electricity should be stored in liquid fuel for the industries through green hydrogen to LH2, MeOH or ammonia.

This study proposes the new concept for near-shore green hydrogen production platform The configuration of the platform is as follows; power rectifier, water electrolysis system, water supply system, brine desalination system (if needed) and hydrogen storage system. This study reviews the current state of green hydrogen production, including the advantages and disadvantages of different technologies and evaluates the factors that influence the installation location of green hydrogen production platforms, such as the availability of renewable energy sources, the proximity of the site to potential customers, and the availability of infrastructure. It also examines the optimization of the topside process design for green hydrogen production platforms, including the selection of the most suitable process units, the optimization of their design parameters, and the selection of the most suitable control strategies.

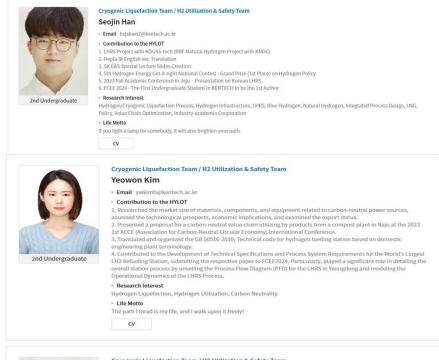
To develop this project, we have conducted research in collaboration with international specialized organizations from various fields. Firstly, for the topside process, we partnered with ITM Power, a specialist in electrolysis, and Linde, an expert in liquefied gases. HD KSOE participated in the design of the floating platform and the liquefied hydrogen CHS system. Economic Evaluation was handled by KENTECH and Fraunhofer. Lastly, in the field of rules and regulations. ABS (American Bureau of Shipping) was involved in the project.

#### 1. Introduction

Humanity is currently facing on a critical environmental crisis due to climate change and global warming. These pressing challenges have prompted the need for urgent and decisive actions to transition into an era of eco-friendly de-carbonization. In this context, the International Maritime Organization's (IMO) MEPC80 meeting has reinforced ambitious de-carbonization goals for the maritime industry, further emphasizing the importance of innovative technologies to achieve these targets.



SCI Subject 15: Development of Technical Specifications and Process System Requirements for the World's Largest LH<sub>2</sub> Refueling Station (Accepted to FCEE, to be published)





Cryogenic Liquefaction Team / H2 Utilization & Safety Team

#### Yunjeong Choi

Contribution to the HYLOT

Research Interest

Hydrogen utilization especially in the space industry, Hydrogen safety standard

The mind is its own place, and in itself can make a heaven of hell, a hell of heaven



2024 2nd International Forum on Clean Energy Engineering Tokyo, Japan | January 19-21, 2024

#### **Notification of Acceptance of the FCEE 2024**

http://fcee.net/index.html

Paper ID: OI1001

Development of Technical Specifications and Process System Requirements for the World's

Largest LH2 Refueling Station

Dear Seojin Han, Yeowon Kim, Yunjeong Choi and Jihyun Hwang,

First of all, thank you for your concern. 2024 2nd International Forum on Clean Energy Engineering (FCEE2024) review procedure has been finished. We are delighted to inform you that your manuscript has been accepted for presentation at 2024 2nd International Forum on Clean Energy Engineering (FCEE2024), January 19-21, 2024 in Tokyo, Japan. Your paper was tripling blind-reviewed and, based on the evaluations. The reviewers' comments are enclosed.

The conference received papers from about 8 different countries and regions during the submission period. And there are about 30 papers accepted by our reviewers who are international experts from all over the world. The selected papers could be published in the international publisher with high quality. According to the recommendations from reviewers and technical program committees, we are glad to inform you that your paper identified above has been selected for publication and oral presentation. You are invited to present your paper and studies at FCEE conference that will be held during January 19-21, 2024 in Tokyo, Japan.

Papers submitted to FCEE 2024 will go through peer review performed by technical program committee members and international reviewers. Selected papers will be published in the International Conference Proceedings of E3S Web of Conferences (Open Access proceedings in Environment, Energy and Earth Sciences), which will be sent to Scopus, CPCI (Web of Science), CAS, DOAJ, EBSCO, ProQuest and other major databases for indexing.

#### (Important Steps for Your Registration):

- 1. Revise your paper according to the Review Comments in the attachment carefully. (Five authors at most each
- 2. Format your paper according to the Template carefully. http://fcce.net/Template.docx (DOC Format)
- 3. Fill in the copyright form which you can download from the following link:

http://fcee.net/copyright-form.pdf

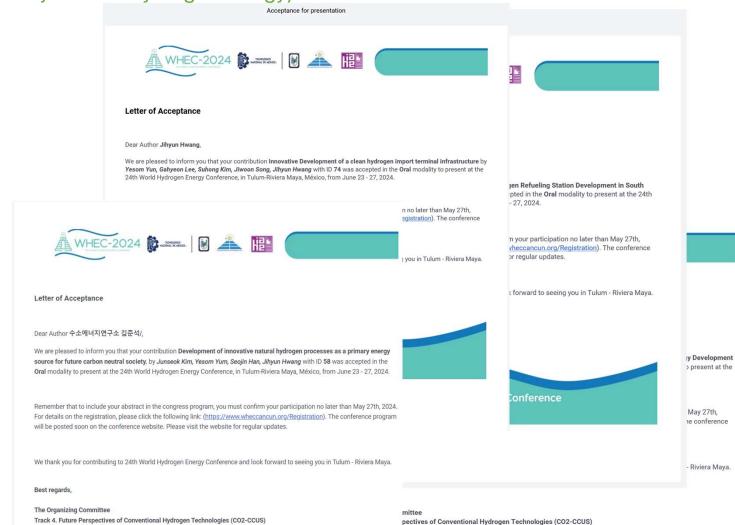
4. Register through the link directly:

http://confsys.iconf.org/register/fcee2024 38



SCI Subject 16: WHEC 2024 Subjects (5 Abstracts accepted to WHEC, selected subjects to be published to international journal of hydrogen energy)

24th World Hydrogen Energy Conference



#### All HYLOT Researchers

24th World Hydrogen Energy Conference

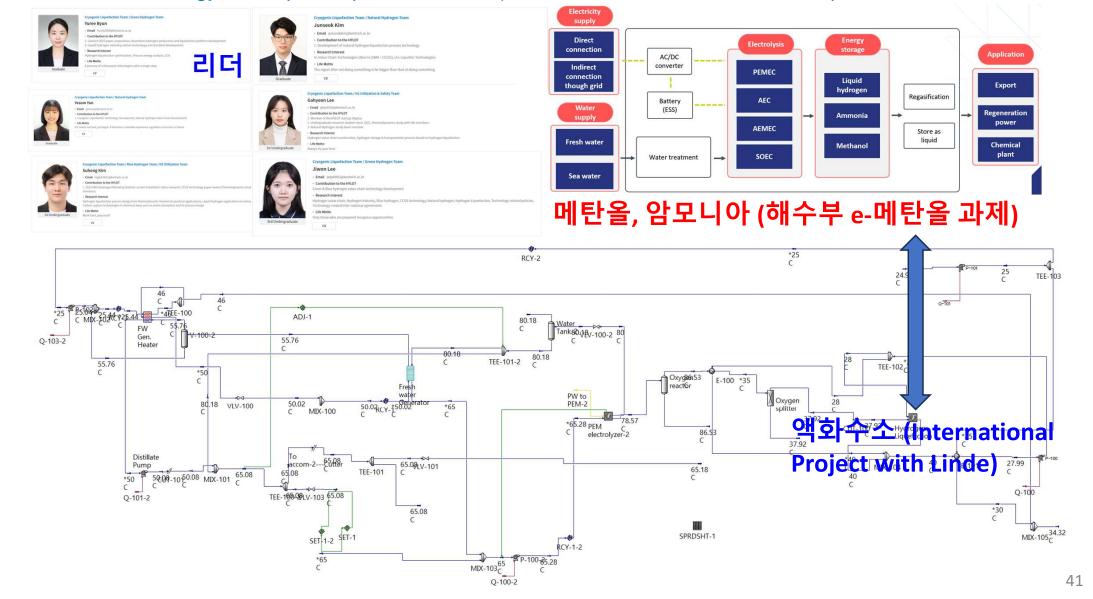
## VI. 2024년 연구 과제



#### 그린 수소 연구 과제



연구 과제 1 : Offshore / Nearshore Green Hydrogen Production / Storage (LH2 / Ammonia / 메탄올)
 Technology Development (발주처 : 신규 과제, 해수부 e-메탄올 & 에기평 국제공동연구)

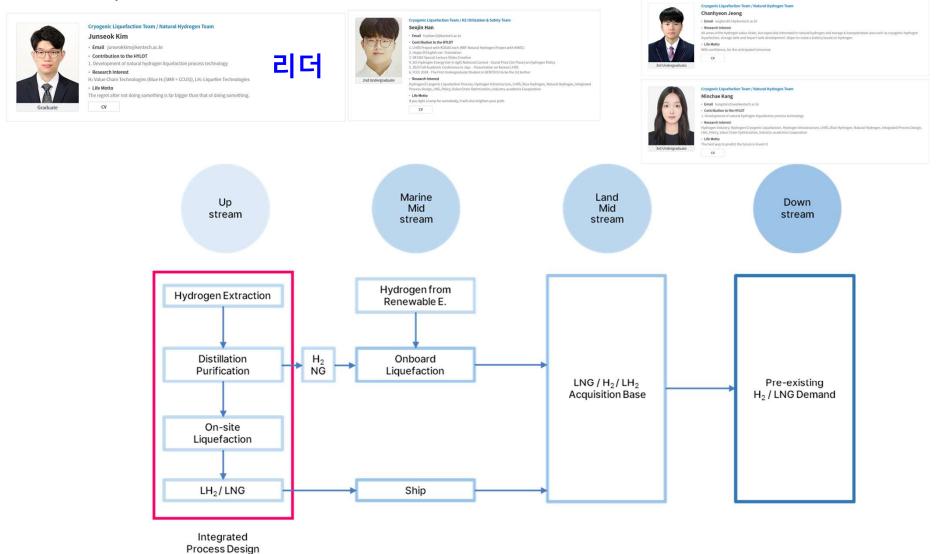


#### 천연 수소 연구 과제



연구 과제 2 : Optimal Natural Hydrogen Process Development (발주처 : 신규과제, KNOC (한국석유공사) 제안



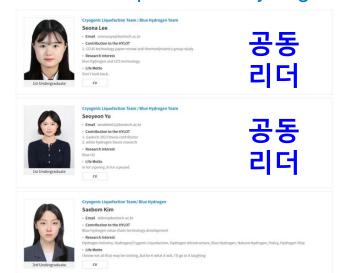


+Petro/Gas/CCS

#### 블루 수소 연구 과제



연구 과제 3 : Optimal Blue Hydrogen Technology Development (발주처 : 신규과제, 한양)







#### 묘도 에코에너지 허브 개요

위치 전남 여수 묘도 및 여수국가산업단지 일원

사업 내용 탄소 중립 생태계를 갖춘 에너지 생산.

유통·활용 거점 구축

사업비 약 15조5000억원

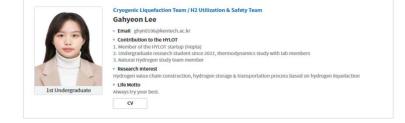
사업 주체 전남도, 한양, GS에너지, 한국서부발전 등

#### 극저온 액화 연구 과제



 연구 과제 4: Development of Original technology for large capacity hydrogen liquefaction linked with renewable energy (발주처: 기존과제, 한전 전력연구원)





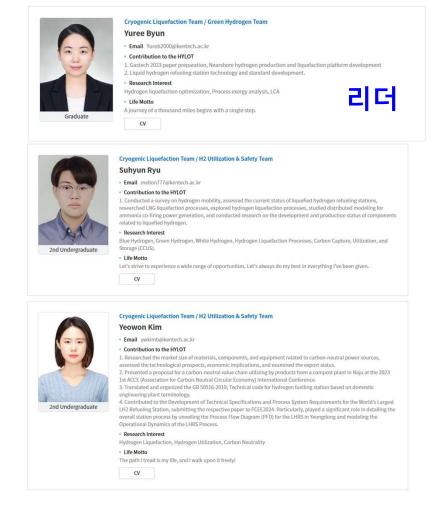


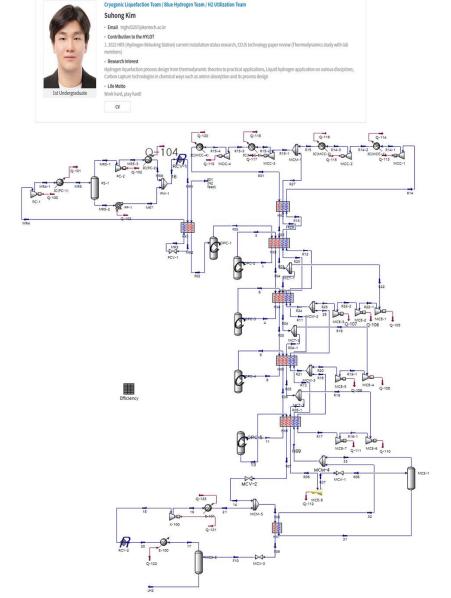


#### 극저온 액화 연구 과제



연구 과제 5 : New Hydrogen Liquefaction Process Cycle Development (발주처 : 신규과제, KRISO)

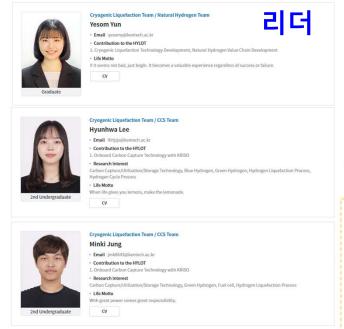




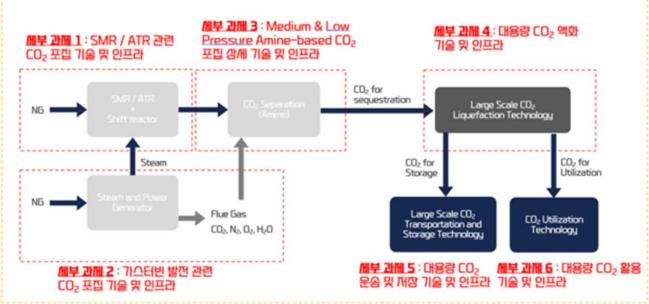
#### CCS 연구 과제



연구 과제 6 : CCUS Cluster development (발주처 : 신규과제, KIAT, 수주 전)



#### CCUS 클러스터

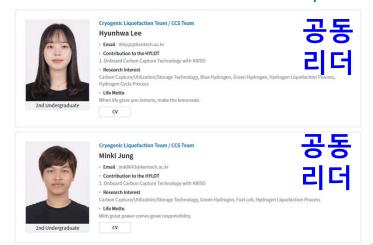


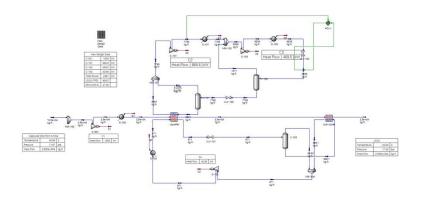
세부 과제 7: CCUS 클러스터 전주기 통합 제어 / 이스템 기술 및 인프라

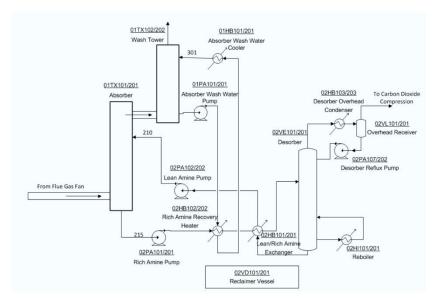
#### CCS 연구 과제



➤ 연구 과제 7 : Onboard CCS development (발주처 : 기존과제, KRISO)



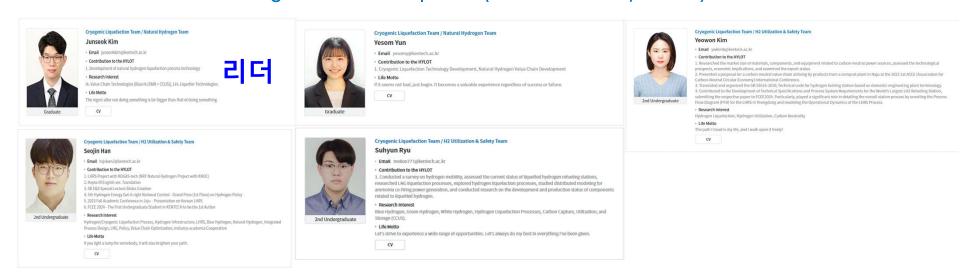


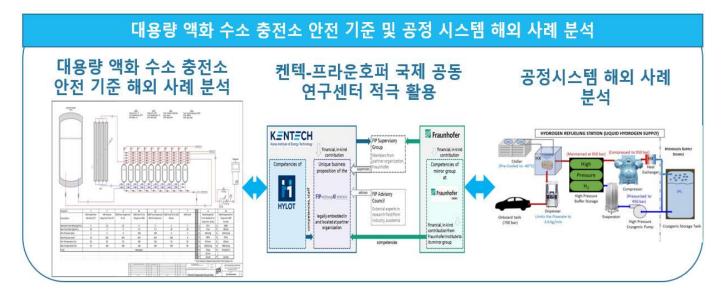






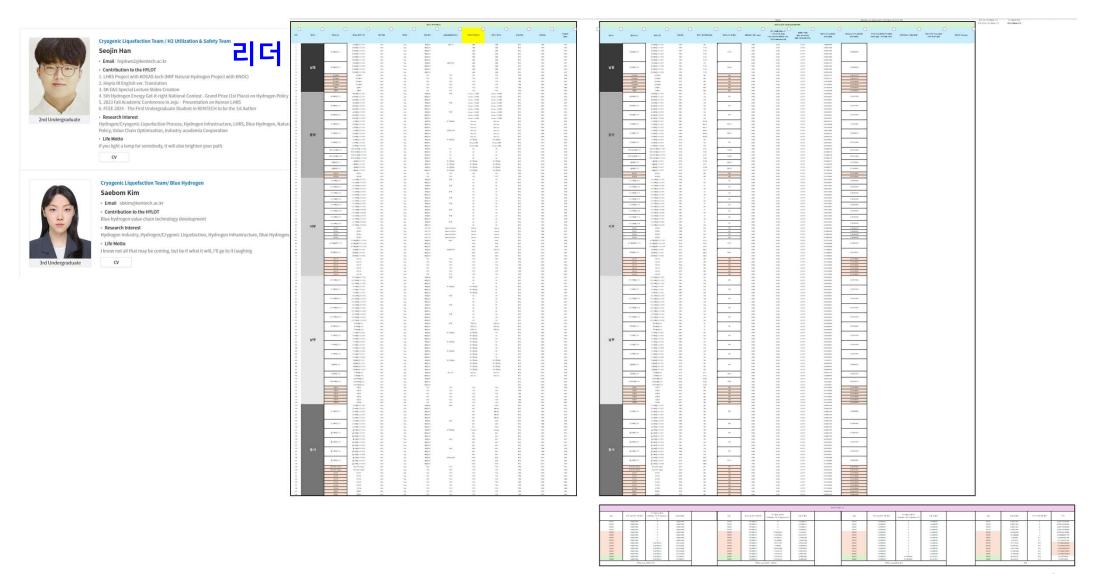
연구 과제 8 : LH2 Refueling Station Development (발주처 : 기존과제, KETEP)





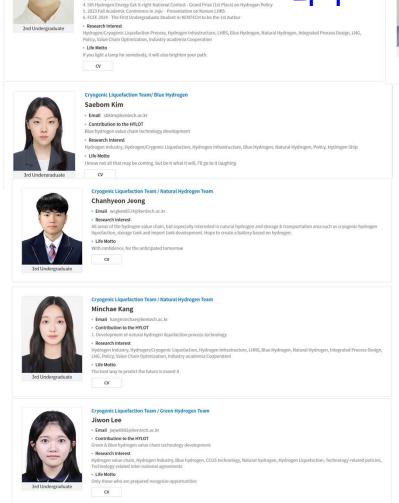


연구 과제 9 : CHPS Evaluation (발주처 : 신규과제, 벽산)





연구 과제 10 : Hydrogen Technology / Economy Evaluation (발주처 : 신규과제, 프랑스기업)



Cryogenic Liquefaction Team / H2 Utilization & Safety Team

Contribution to the HYLOT

2. Hepta IR English ver. Translation



Cryogenic Liquefaction Team / H2 Utilization & Safety Team

#### Suhyun Ryu

- Email mellon777@kentech.ac.kr
- Contribution to the HYLOT
- Conducted a survey on hydrogen mobility, assessed the current status of liquefied hydrogen refueling stations, researched LNG liquefaction
  processes, explored hydrogen liquefaction processes, studied distributed modeling for ammonia co-firing power generation, and conducted
  research on the development and production status of components related to liquefied hydrogen.
- Research Interes

Blue Hydrogen, Green Hydrogen, White Hydrogen, Hydrogen Liquefaction Processes, Carbon Capture, Utilization, and Storage (CCUS).

. Life Motto

Let's strive to experience a wide range of opportunities. Let's always do my best in everything I've been given.

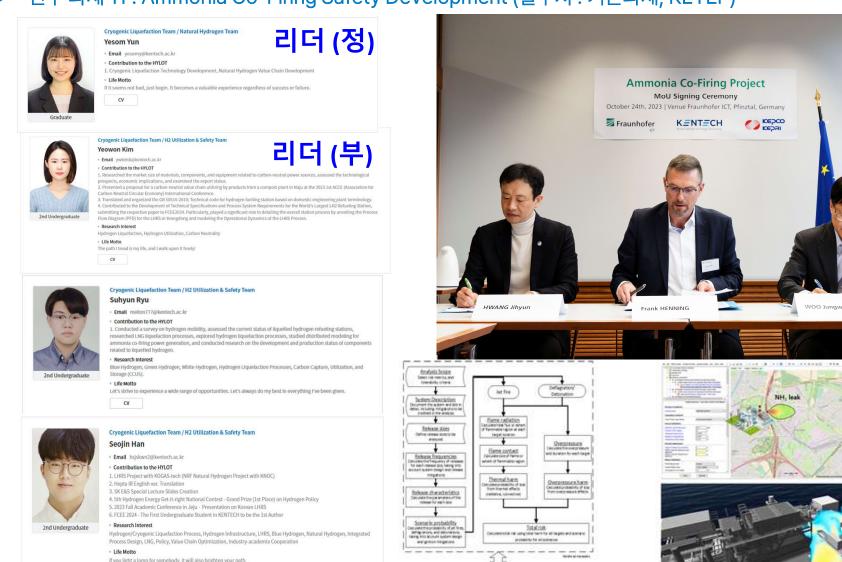
CV



CV



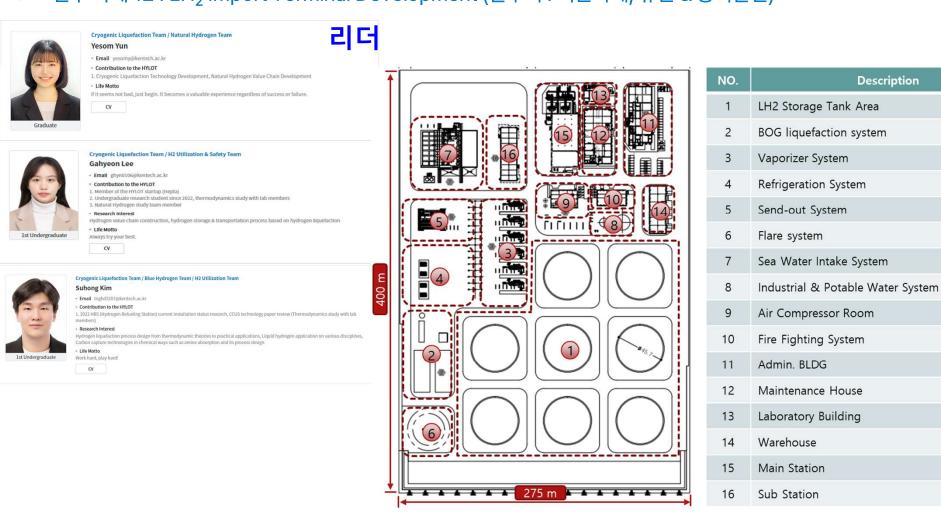
연구 과제 11 : Ammonia Co-Firing Safety Development (발주처 : 기존과제, KETEP)



Engage with decision makers



연구 과제 12 : LH<sub>2</sub> Import Terminal Development (발주처 : 기존과제, 유신 & 동서발전)



#### 글로벌 연구 센터 구축 과제



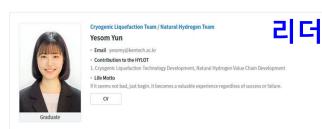
 연구 과제 13 : NSF Global Center Development (발주처 : US National Science Foundation , University of Connecticut)



#### 국내 연구 센터 구축 과제



▶ 연구 과제 14 : 보령시 액화수소 연구소 구축 (발주처 : 보령시)







Cryogenic Liquefaction Team / Natural Hydrogen Team

Junseok Kim

Email Junseokkim@kentech.ac.kr

Contribution to the HYLOT

Development of natural hydrogen liquefaction process technology
 Research Interest
 Havalue Chain Technologies (Blue Ha(SMR + CCUS)), LHa Liquefier Technologies

LITE MOTTO
The regret after not doing something is far bigger than that of doing something.

액화수소 핵심기술 인프라 [전문 LAB] 구축 2024. 4

#### □ 추진체계(안)



## VII. 2024년 국내외 학회 연구 결과 발표



### FCEE 2024 - 국외 학회 (도쿄, 일본)



➤ FCEE 2024 논문 통과 및 Keynote Speaker 승격 발표 및 수상





# 2024년 춘계 수소 및 신에너지 학회 – 국내 학회 (제주도, 한국)

**H** HYLOT

2024년 춘계 수소 및 신에너지학회 논문 발표 및 논문상 수상



### OTC 2024 - 국외 학회 (휴스턴, 미국)



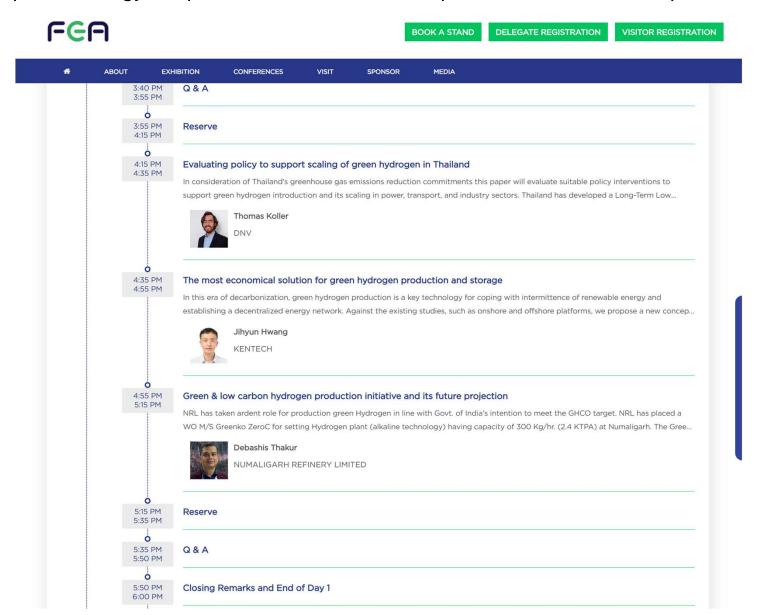
> OTC (Offshore Technology Conference) 2024 논문 통과 및 발표 예정 (2024년 5월 8일 발표 예정)



### FEA 2024 - 국외 학회 (방콕, 태국)



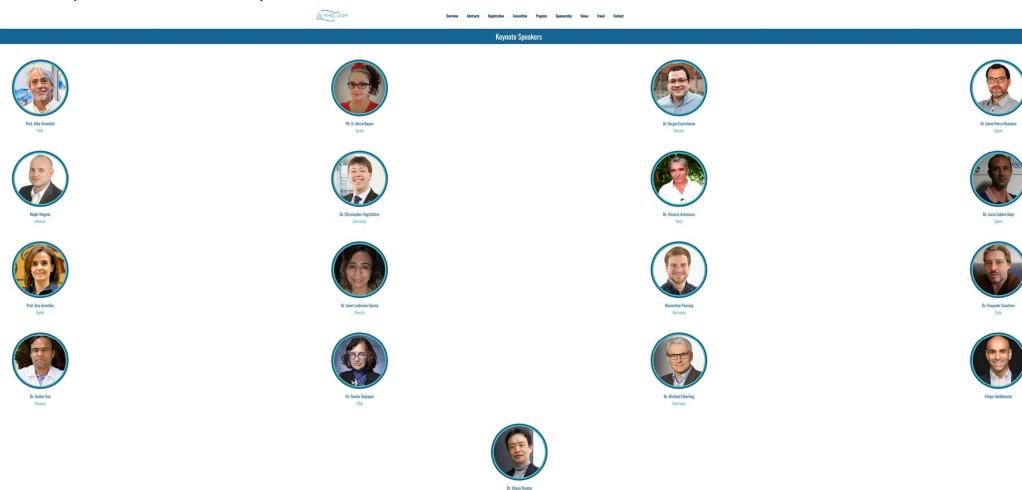
FEA (Future Energy Asia) 2024 논문 통과 및 발표 예정 (2024년 5월 15일 발표 예정)



### WHEC 2024 - 국외 학회 (칸쿤, 멕시코)



 WHEC (World Hydrogen Energy Conference) 2024 논문 5편 통과 및 Keynote Speaker 승격 발표 예정 (2024년 6월 발표 예정)



### EKC 2024 - 국외 학회 (버밍햄, 영국)



➤ EKC (Europe-Korea Conference) 2024 논문 초록 투고 예정 (2024년 7월 30일 ~ 8월 2일)



### UKC 2024 – 국외 학회 (샌프란시스코, 미국) 웹HYLOT



UKC (US-Korea Conference) 2024 논문 초록 투고 예정 (2024년 8월 21일 ~ 8월 24일)



# Drilling for Hydrogen 2024 – 국외 학회 (휴스턴, 미국)



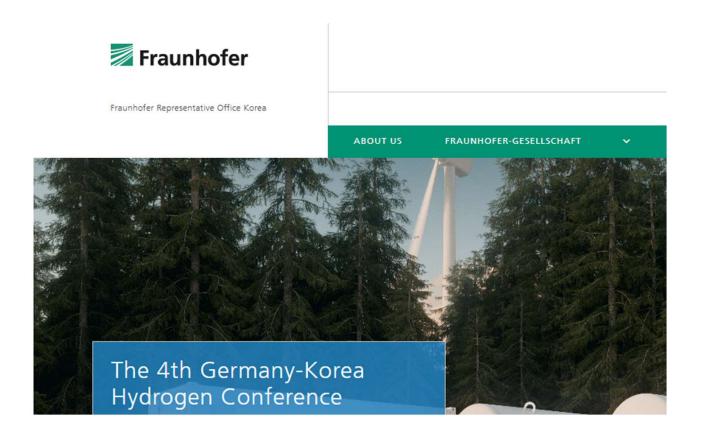
Drilling for Hydrogen 2024 논문 초록 투고 완료 (2024년 9월 )



### 2024 Germany-Korea Hydrogen Conference – 국외 학회 (할레, 독일)



2024 Germany-Korea Hydrogen Conference 논문 초록 투고 예정 (2024년 10월 학회 예정)



### H-NAT - 국외 학회 (파리, 프랑스)



➤ H-NAT 학회 논문 초록 투고 예정 (2024년 11월 학회 예정)



### Laurance Reid Gas Conditioning Conference – 국외 학회 (오클라호마시티, 미국) HYLOT

➤ LRGCC 학회 논문 초록 투고 예정 (2025년 2월 학회 예정)



# VIII. 자유 토론



# IX. 팀워크 게임





감사합니다.

