



NTU@Indonesia Joint Institute for Sustainable Growth

13 July 2022



Executive Summary

- In synergy with Indonesian MOECRT vision of Kampus Merdeka, which provides opportunities for students to hone skills according to their talents and interests by going directly into the world of work as preparation for future careers ^[1].
- The Joint Institute is an (outcome-based) **Research & Education hub** which brings the expertise from NTU Singapore to train high quality Indonesian human resources with multidisciplinary competencies which are **relevant for the current and future Industry**.
- The Education element, which will focus on practical sustainability solution, will be intimately linked to real outcome in the forms of cutting edge research, corporate laboratories, and start-up companies.
- **Scope:** long term with short term theme (5 years) relevant to the need of Indonesia. The first theme will be Sustainability and Energy. The Institute will be a Living Lab which showcases the application of different types of renewable energy and sustainable practices.
- Partners: ITB,UGM, UI, ITS, etc

[1] <https://kampusmerdeka.kemdikbud.go.id/>

NTU@Indonesia Joint Institute for Sustainable Growth

Undergraduates,
Postgraduates

Visiting Professors,
Educators

Resident Researchers,
Administrative Staff

Sustainability RD&D Living Lab (*Energy, Water, AI + Data Analytics: for Smart Cities, Islanded Communities, and Agritech*)

Research



Education



Enterprise



Community



Mission:

To **share** key learnings from Singapore's IHLs in nurturing next generation sustainability talent and **co-create** knowledge with Indonesia to address emerging sustainability challenges in the region

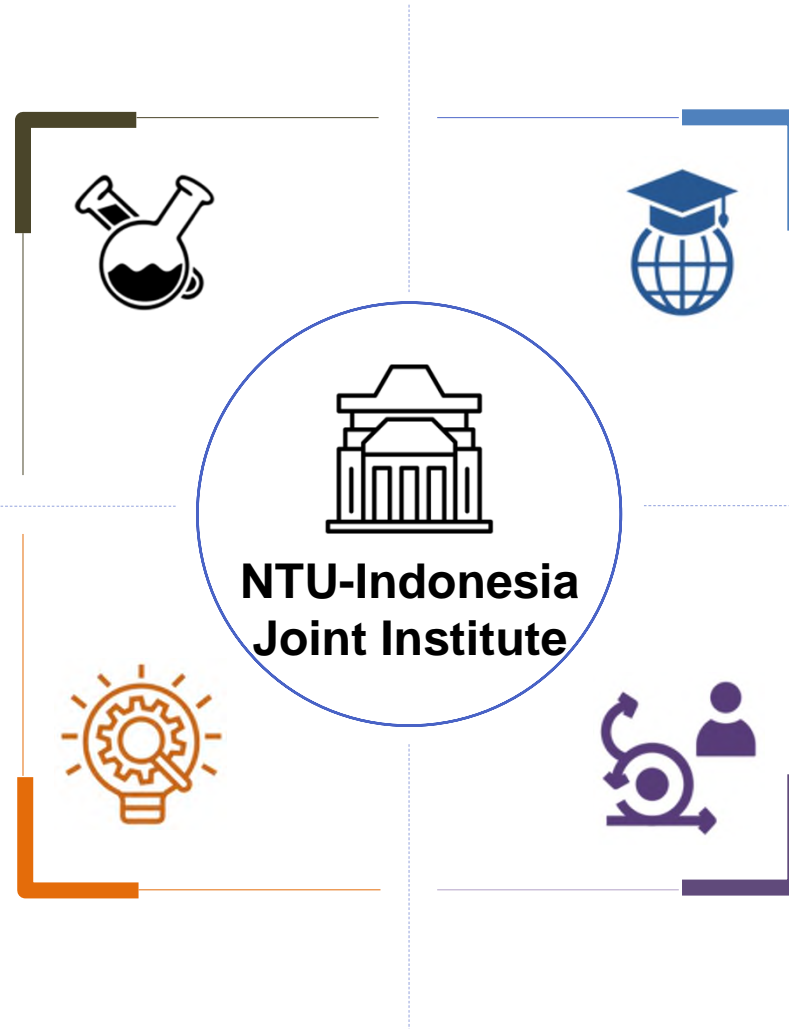
NTU@Indonesia Joint Institute for Sustainable Growth

Research

- PhD & Masters projects
- Undergraduate research projects
- State-of-the-Art equipment
- Living Labs & Test Beds
- Facilities for vocational training
- Public-Private-Partnership

Enterprise

- Co-innovation programme
- Incubators/Accelerators
- Technology translation programme
- Industry / Start-up mentorship
- Corporate Laboratories, Joint Centres
- Technology innovation deployment



Education

- Semester-long Immersion
- Vacation (Summer) programmes
- Bridging (Preparatory) courses
- Workshops / Courses for teaching at NIE¹⁾ / TEA²⁾ / InsPIRE³⁾
- Online courses
- Thematic lecture series
- Innovation/Design projects
- Hackathons

Community

- Community involvement programmes
- Service-learning trips
- Outreach and advocacy campaigns
- Harnessing innovation in responding to needs and challenges

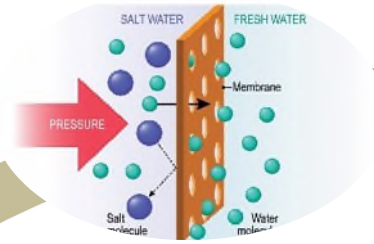
1) NIE: National Institute of Education

2) Teaching Excellence Academy, NTU

3) InsPIRE: Institute for Pedagogical Innovation, Research and Excellence

Sustainability RD&D Living Lab

*Water technologies –
membranes,
desalination, treatment*



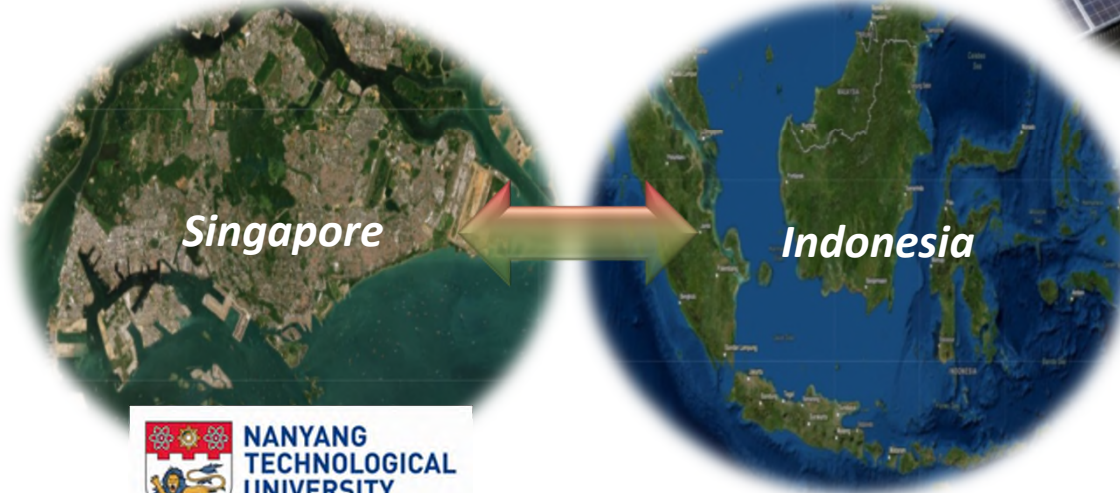
*Renewable energies –
solar, wind*



*Energy Efficiency
Technologies –
optimisation, AI*



***Energy & Water Technologies
for Sustainable Development***



*Energy storage systems
– batteries*



*Digital technologies –
data analytics,
control systems*



***Tailored towards Urban &
Islanded Community Needs***

*Power systems –
renewables integration,
power electronics*



Possible Living Lab could be Modeled against: Renewable Integration Demonstrator – Singapore (@ Semakau Landfill Singapore)

1 Renewables:

Solar, Wind (onshore /offshore) & Tidal



5 VOI: Visualization, Optimization AI, Energy/Power Management Platforms



8 Techno-enviro-socio Impact:

Techno-socio Economics, EIA, Certification



2 Energy Storage/H₂
Batteries, Supercaps, CAES, Flywheels, Power-to-fuels and H₂



3 DERs:
Diesel, Bio-mass, Bio-fuels, Fuel Cells



6 Microgrid Controller:
SW, HW, AC-DC Hybrid Grids, DERMS, SST & Power Electronics



4 Multi-microgrid Systems:

Interconnection, Urban Mesogrids, Blockchain Energy Trading, Resilience And Security



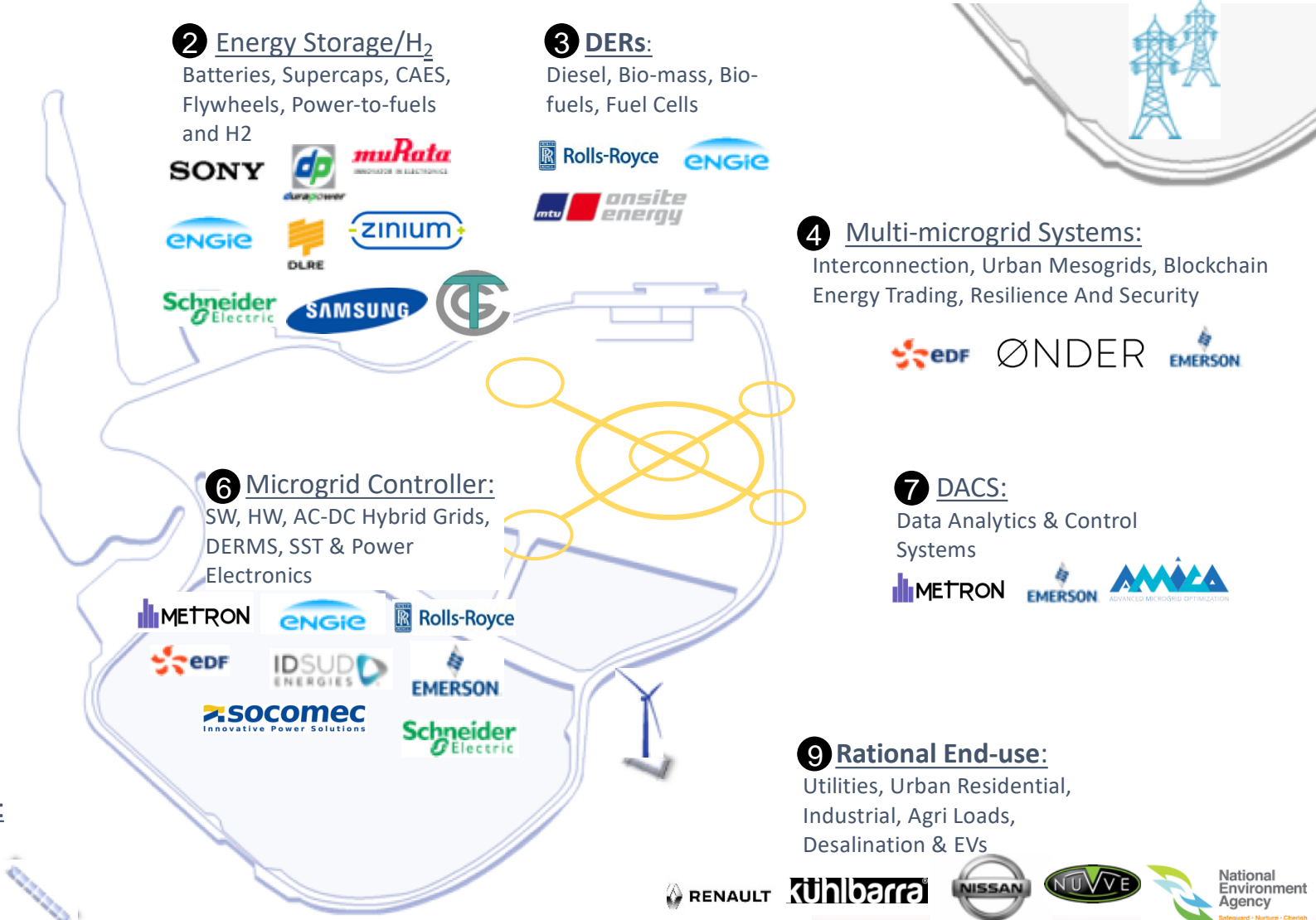
7 DACS:

Data Analytics & Control Systems



9 Rational End-use:

Utilities, Urban Residential, Industrial, Agri Loads, Desalination & EVs



NTU-Indonesia Academic Immersion Programme

Undergraduate Immersion

- 1 semester @ NTU Indonesia + 1 semester @ NTUSg
- Preparatory/ Bridging Programme
- Short-term Programmes
- Joint Programmes in Indonesia

@Indo
+
@NTUSg

@NTUSg

- Semester Immersion
- Summer Programme
- Preparatory/ Bridging Programme
- Thematic Programmes leading to Specialist Certificate

@NTUSg

Post Graduate/Faculty Immersion

- Full-time Masters/PhD
- Post Graduate Certificates
- Mini Masters
- Short-term Programmes
- Joint Research

- 1 semester @ NTU Indonesia + 1 semester @ NTUSg
- Preparatory/ Bridging Programme
- Short-term Programmes

@Indo
+
@NTUSg

Immediate Implementation



Undergraduate Immersion

NTU offers several programme immersion possibilities for incoming Indonesian Students. These include:

Semester Study Abroad

- Semester immersion at NTU
- Semester 1: Early August to Early December
- Semester 2: Mid January to Mid May
- Undergraduate or Masters level students
- Regular Semester Fee-paying mode
- Guaranteed on-campus housing

Summer Programme

- 2 to 6 weeks credit bearing courses (3 to 4 AUs)
- Fee-paying mode

Preparatory Programme

- Cultural Studies and Preparatory English package to prepare students for studies in Singapore
- Take place in either Indonesia or Singapore
- Targeted at undergraduates who wish to come to Singapore for semester immersion or further studies.

Thematic Programmes

- Basket of courses curated around different themes:
 - Sustainability (ASE/COE)
 - AI and Big Data (COE)
 - Power Engineering (COE)
- Leading to Specialist Certificate
- Possibility of research immersion with research institutes/labs within NTU

Joint Programmes in Indonesia

- Jointly organised 2-week short or semester course delivery programmes
- Held in Indonesia
- International students and local and NTU faculty participation
- Cross-cultural collaboration

Educational Immersion Programmes (in Indonesia)



Summer School to provide a stimulating opportunity for young researchers and students to get to know the state of the art technologies.



Workshop for NTU and Indonesian faculty and researchers to learn more about each other's work and to facilitate further collaboration between the two universities.



The exchange of faculty, research staff, and undergraduate and graduate students between the two parties through the NTU@Indonesia Joint Institute.

PG/Faculty Immersion

Pathway to Mini Masters

Short-term Visit

- Foundations of University Learning and Teaching (FULT) (4AU)

And (Optional)

1-2 semester research attachment which may continue into the Long-term visit

Long-term Visit - PG Cert (9AU)

Prerequisite: FULT

Choose either

- Authentic Assessment in Higher Education (4AU)
- Teaching and Learning for the Digital Age (4AU)

To exit with a PG Cert complete

- Academic and Research Integrity (1 AU)

Long-term Visit - Mini Masters (16AU)

- Scholarship of Teaching and Learning (SOTL) (4AU)

Complete 4AU from remaining TLPD module or equivalent elective from NIE MAPE programme

Educator Support Programs



Understanding Your Students



Designing Your Course



Engaging Your Students



Assessing Your Students



Reflecting On Your Teaching



Faculty Development Team

Proposed details for the Joint Institute

- **Eco-campus**
 - On-site or a site easily accessible from main campus
 - with capabilities including: Solar/wind/ battery, microgrid controller, energy dashboard and optimization engine.
 - Physical: Lab space, office space for 200-300 pax → 3000 sqm, living lab space (70,000 sqm or 7 hectares) .
 - Program Management office (1 Director + 3 Program Managers on site)
- **~10-15 Research Projects** with Professors from NTU + Indonesia leading each project:
 - Professors with matching interest with NTU Professors to work on joint research project.
Scientific technical expertise: Electrical, Materials, Civil and Environment, Data Science, etc.
 - Scientific/technical scope may include (but not limited to): PV technologies, Solar to Hydrogen/fuels, data science/digitalization, water purification, etc.
 - NTU Professors will spend a few weeks/year in Indonesia to lead the lab; Indonesian Professors are welcome to visit NTU.
 - Manpower: 10 Senior Research Fellow (NTU alumni etc) + 30 local research staffs.
- **Education:**
 - Annual student mobility: UG/PG students to NTU for exchange (~30-50) and full time Master/PhD students enrolled at NTU (~10).
 - Education program : lectures/workshops by NTU Professors for Indonesian UG/PG students (physically or virtual)
- **Enterprise:** Joint Institute as an incubator for start up companies, corporate labs, joint labs (co-funding with Industries).