



謝依芸 副教授

CAE專題生說明會

02/26/2025





謝依芸 (I-Yun Lisa Hsieh)



Associate Professor (since 08/2024)

Dept. of Civil Eng., NTU (since 08/2020)

Dept. of Chem. Eng., NTU (since 08/2021)

Research Group: e3center.caece.net/

Research Opportunities **OPEN** for both **CivE** and **ChemE**!



Education

Ph.D. in Chem. Eng., MIT (2020)

B.S. in Chem. Eng., NTU (2014)

B.B.A. in Finance, NTU (2014)

Research Interests

Net Zero Strategy

Energy Management

Environmental Policy

Smart Grid

Green Mobility

Climate Justice

Background: On the road to *Net Zero* by 2050

- Paris Agreement:
 - ✓ Global warming $\leq 1.5^{\circ}\text{C}$ above pre-industrial levels to avert the worst of climate change.
 - ✓ Global carbon emissions should be reduced by 45% by 2030 and reach net zero by 2050.
- ~75% of the global GHG emissions come from our energy consumption.

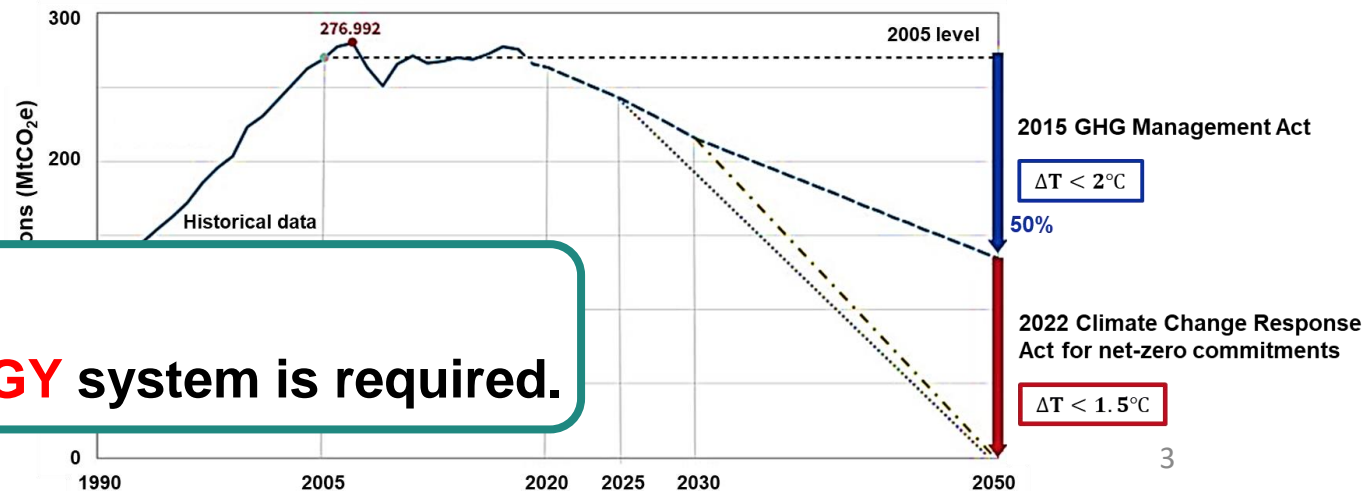
Taiwan:

- Roadmap for net zero emissions by 2050 has recently been published (3/30/2022).

✓ 90% GHG emissions from energy use.



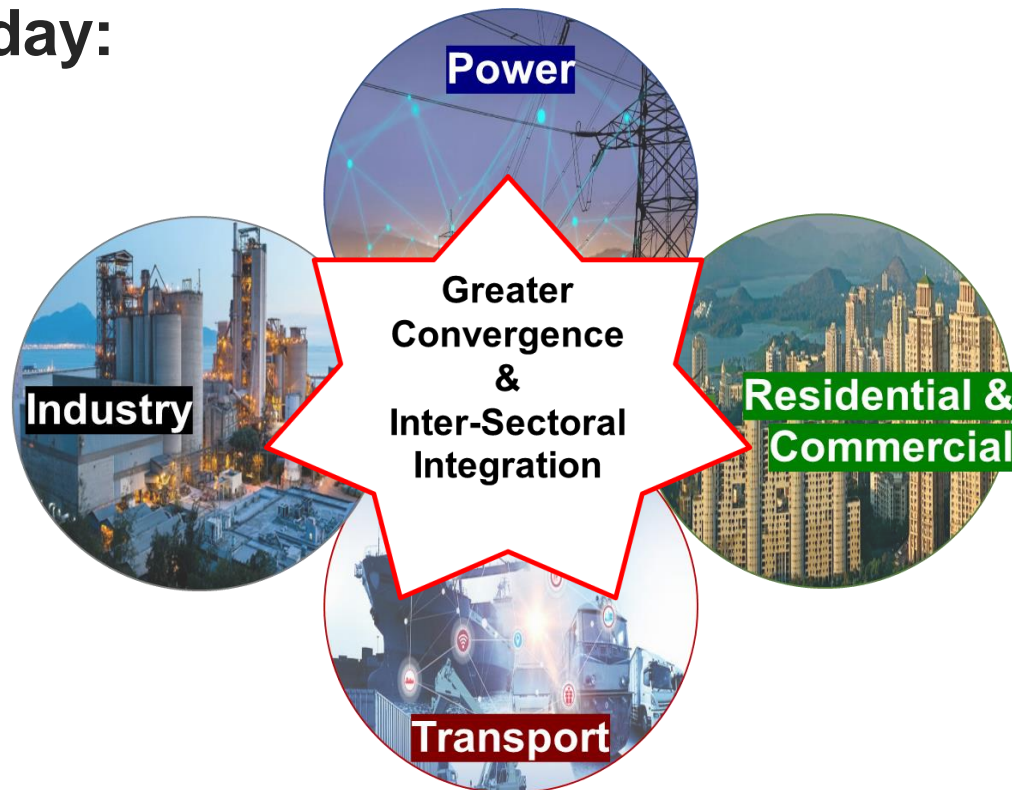
To achieve net-zero emissions,
a complete transformation of the **ENERGY** system is required.



The Energy Sector: Challenges and Trends

- A global community's major CHALLENGE is how to significantly reduce energy-related emissions while simultaneously satisfying the growing energy demand.
- Today's energy systems are undergoing transformations...

Today:



“Sector Coupling” 能源耦合

- Integration of energy end-use and supply sectors with one another.
- ◆ A great example of sector coupling is transportation electrification.





臺灣2050淨零排放路徑及策略總說明

2022年3月30日



2050 淨零轉型 化危機為轉機並掌握商機 臺灣與世界共同邁向淨零

氣候緊急全球挑戰

全球暖化將在20年內升溫1.5°C

淨零碳排國際趨勢

全球已有136個國家宣示淨零排放目標

綠色供應鏈與碳關稅

我國為出口導向國家

2021年出口總值達4,463億美元 約佔GDP之57%



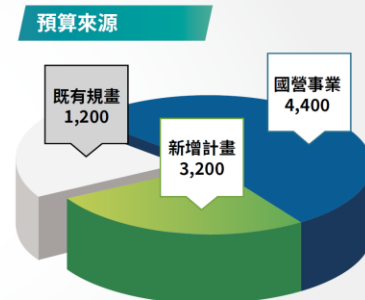
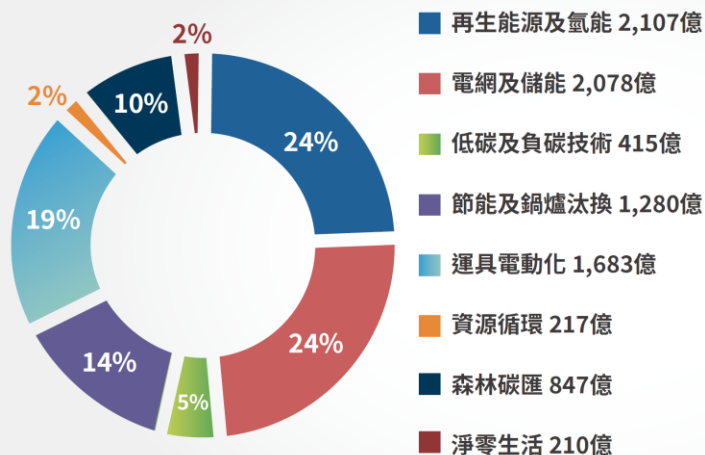
臺灣2050 淨零轉型

十二項關鍵戰略

Ongoing research in E3



2050淨零轉型主要計畫 至2030年預算近9千億





Developing Multi-disciplinary Approaches and Decision Support Tools to Accelerate Net-Zero Transitions



- TEA: Techno-Economic Analysis
- OPT: Optimization

- CV : Computer Vision
- AI : Artificial Intelligence

- LCA: Life Cycle Assessment
- STAT: Statistical Computing



A Spectrum of Energy-Related Topics Are Under Exploration...



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Ongoing Research Topics Include:

Net-Zero Emission Strategy:

- Energy Storage Systems
- Offshore Wind to Green H2



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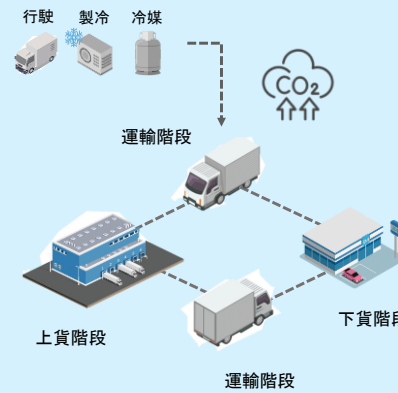
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Ongoing Research Topics Include:

Smart and Sustainable Logistics:

- Cold-Chain Transport
- Automatic Warehouse



TEA

OPT

CV

AI

STAT

LCA



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Ongoing Research Topics Include:

Electric and Hydrogen Mobility:

- Battery EV & Grid
- Fuel Cell EV & H2
- H2/NH3 in Marine Transport



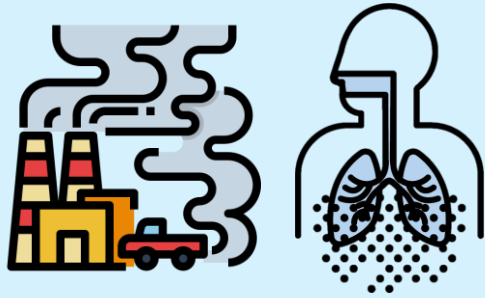
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Ongoing Research Topics Include:

Air Quality & Health Impacts:



- Policy Impacts
 - Air Pollution Control
 - Electrify Everything Strategy
- Co-Benefits of Net-Zero Policies

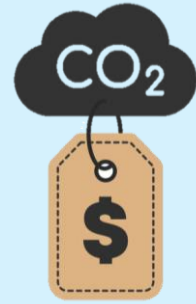


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Ongoing Research Topics Include:



Just Transition:

- Carbon Burden
- Energy Poverty



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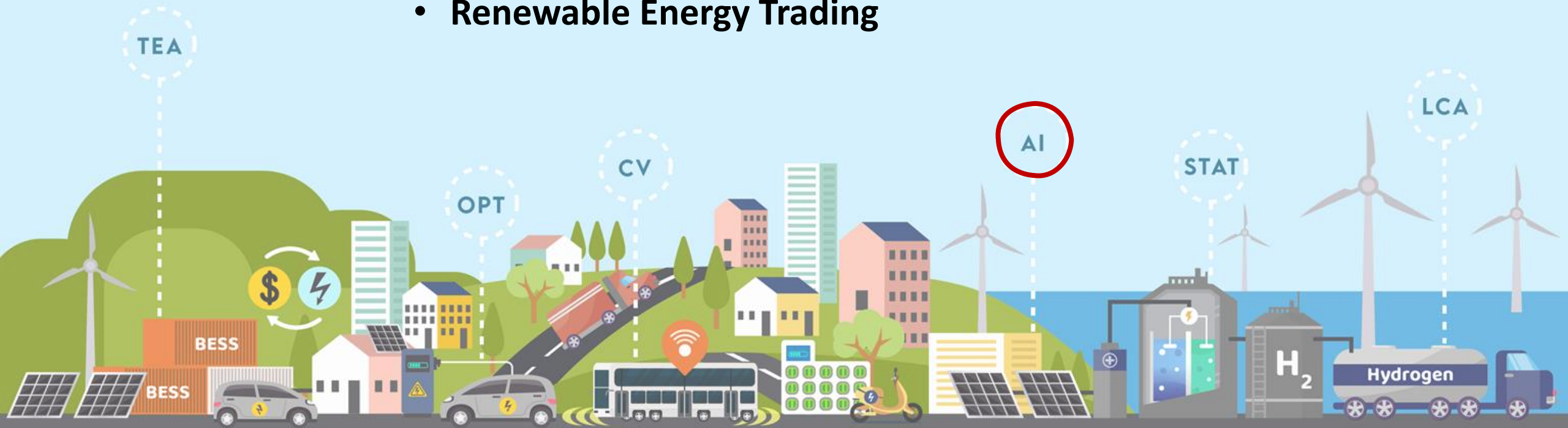
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Ongoing Research Topics Include:

Smart Low-Carbon Grid:

- Energy Supply – Solar/Wind
- Renewable Energy Trading



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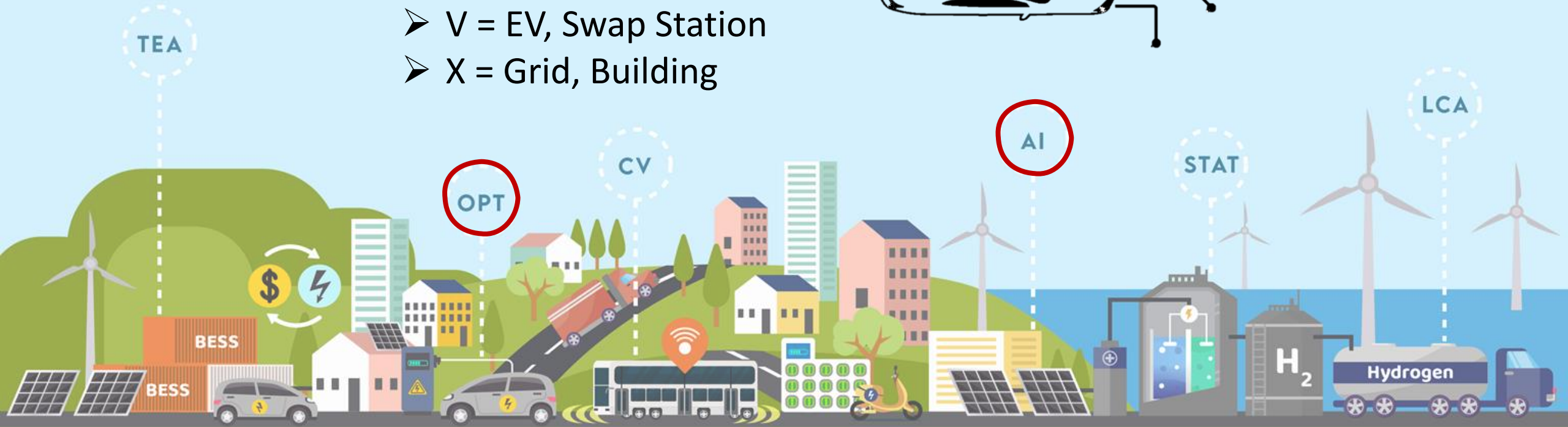
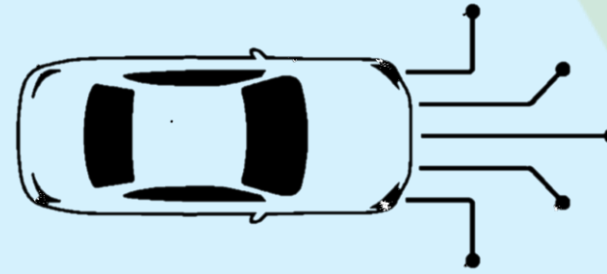
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Ongoing Research Topics Include:

Energy System Management:

- **Vehicle-to-Everything (V2X)**
 - V = EV, Swap Station
 - X = Grid, Building



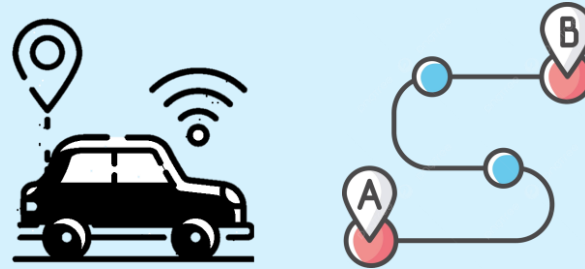
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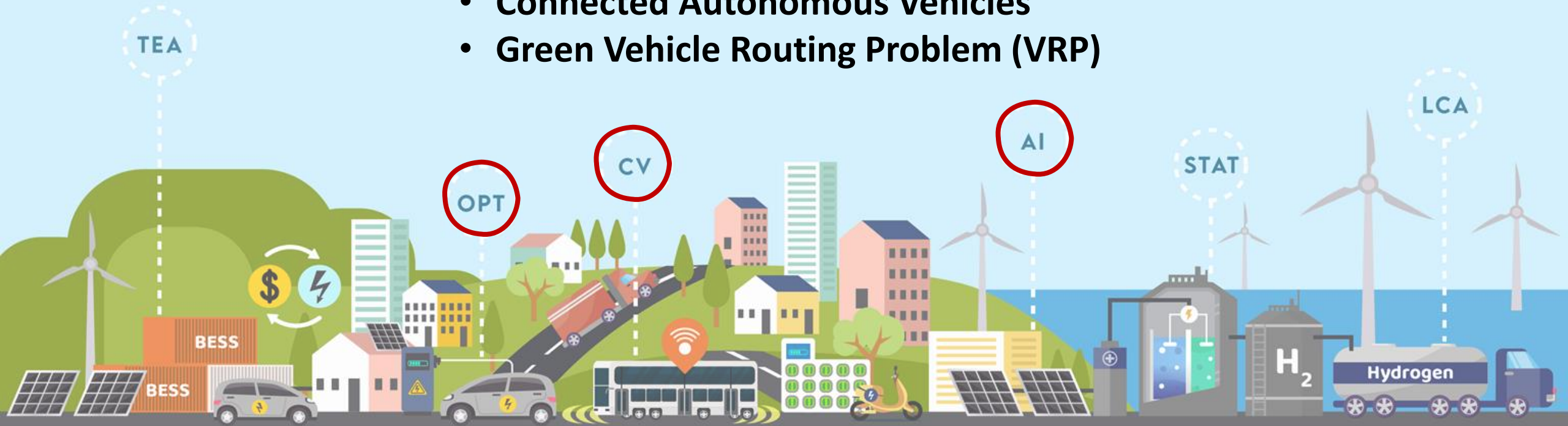
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Ongoing Research Topics Include:

Smart E-Mobility:



- **Connected Autonomous Vehicles**
- **Green Vehicle Routing Problem (VRP)**



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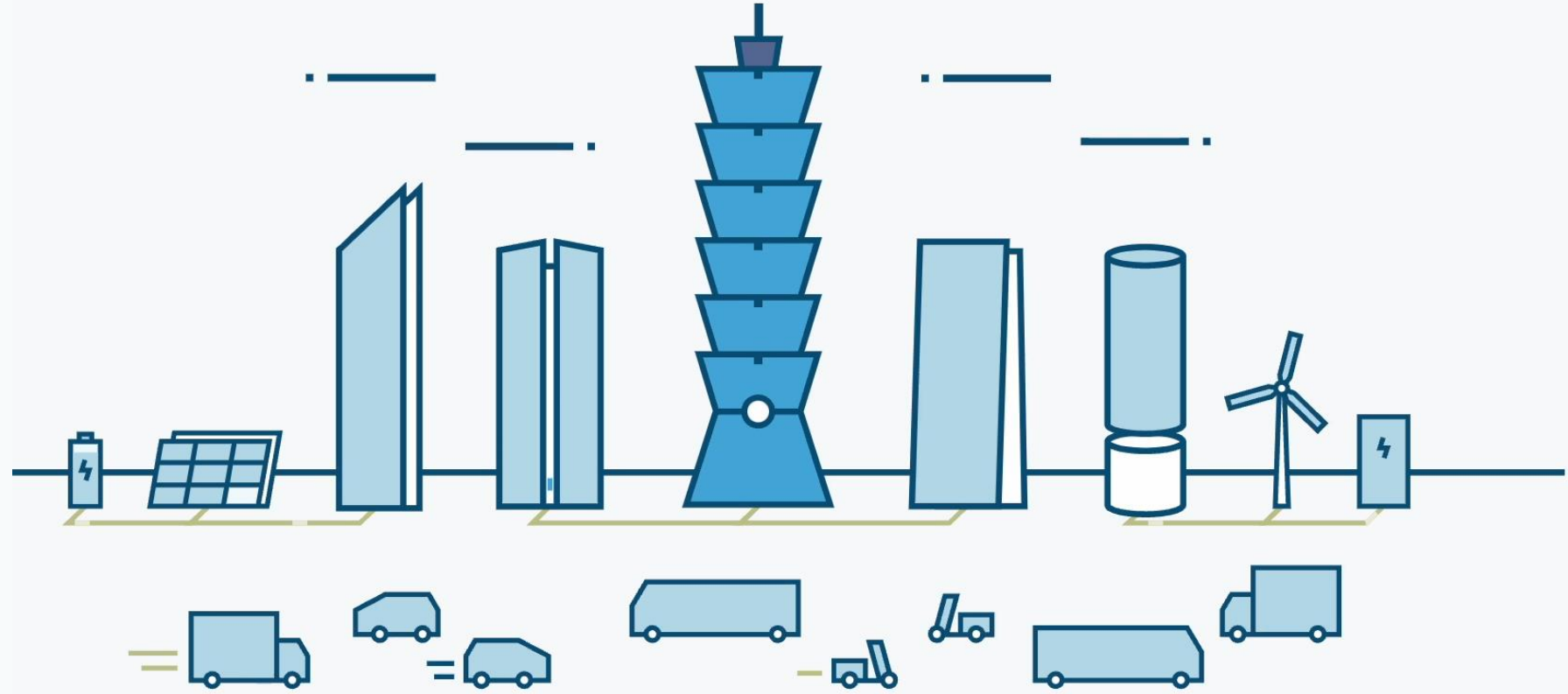
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E3 Center

Directed by Professor I-Yun Lisa Hsieh

Energy _
Economics _
Environment _

About Us



Your Vision of a Future Sustainable Smart City?



NTU E3:

Diverse, Dynamic &

Innovative



Fun &

Productive



Acknowledgements:



if "Data-driven solutions" in your_interests and any(interest in your_interests for interest in ["Energy System Management", "Smart Low-Carbon Grid", "E- and H2-Mobility", "Net-Zero Emission Strategy"]): contact_me()



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