



ESR 5.4 Exploitation of biogas in chemical energy and liquid fuel production

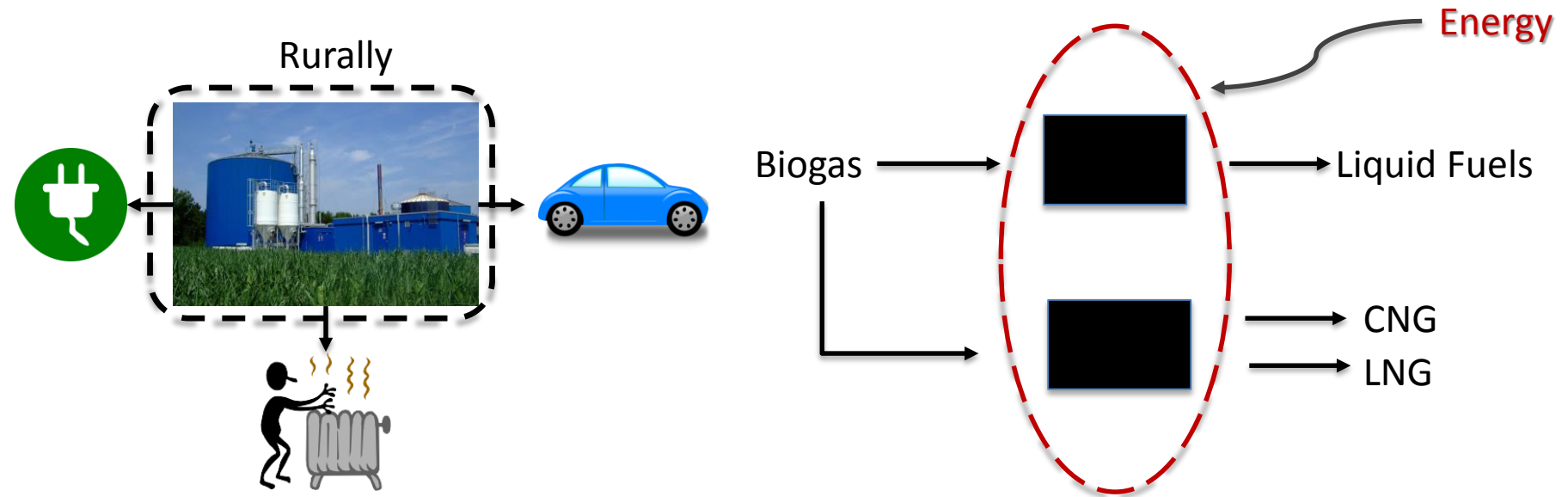
Rawan Hakawati

*Queen's University Belfast, School of Chemistry and Chemical Engineering
Supervisors: Prof D.Rooney, Dr B.Smyth, Dr G.McCullough*



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I. Biogas applicability



Biogas

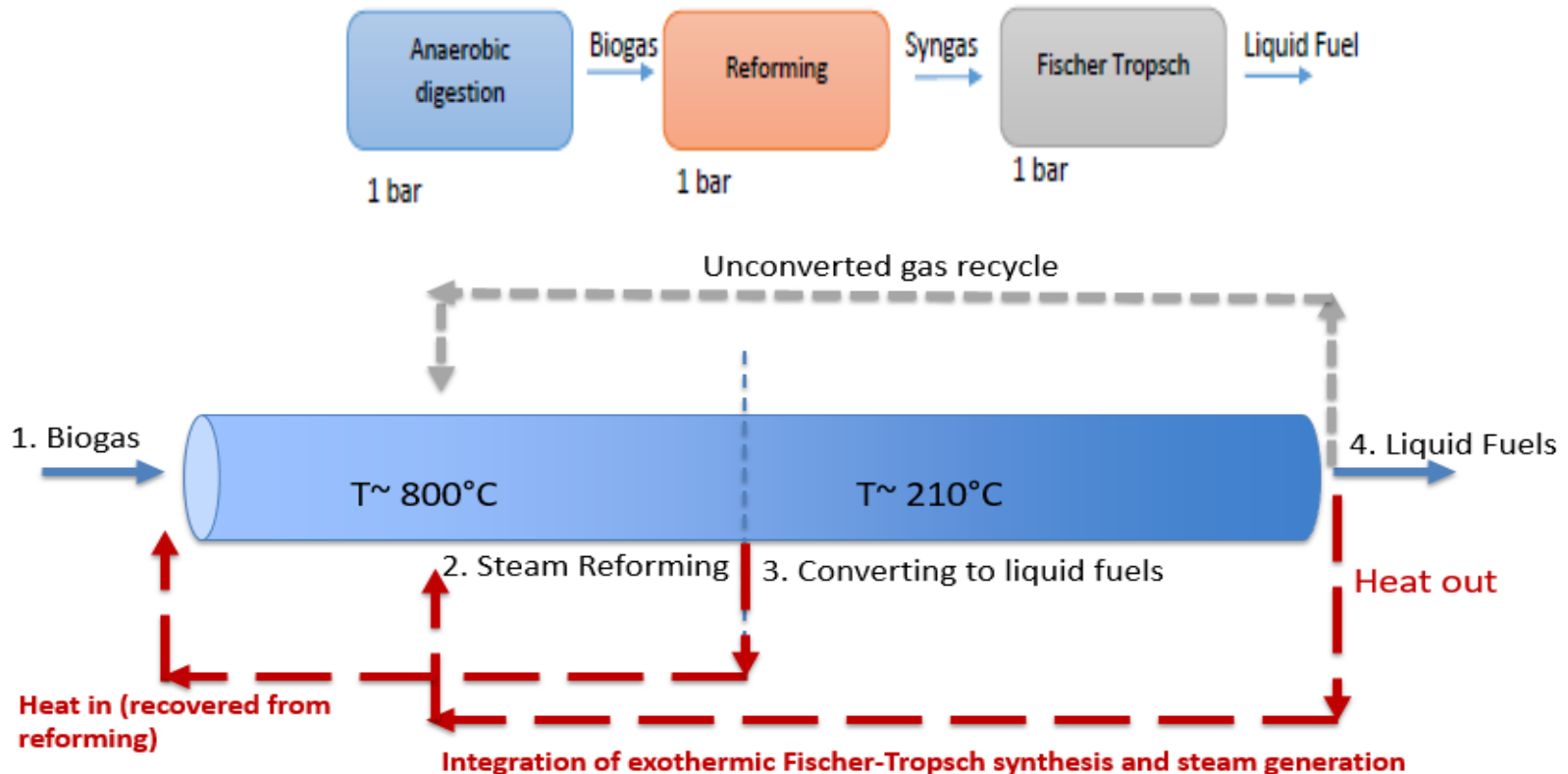
- CH₄ at 0.0378MJ/L
- CO₂ at 0 MJ/L

Fuel type	Energy Density (MJ/L)
Diesel/Fuel oil	35.8
CNG (compressed natural gas at 250 bar)	9
LNG (liquefied natural gas at -160°C)	22

**Energy change is accompanied with ΔP and ΔT

II. The big picture

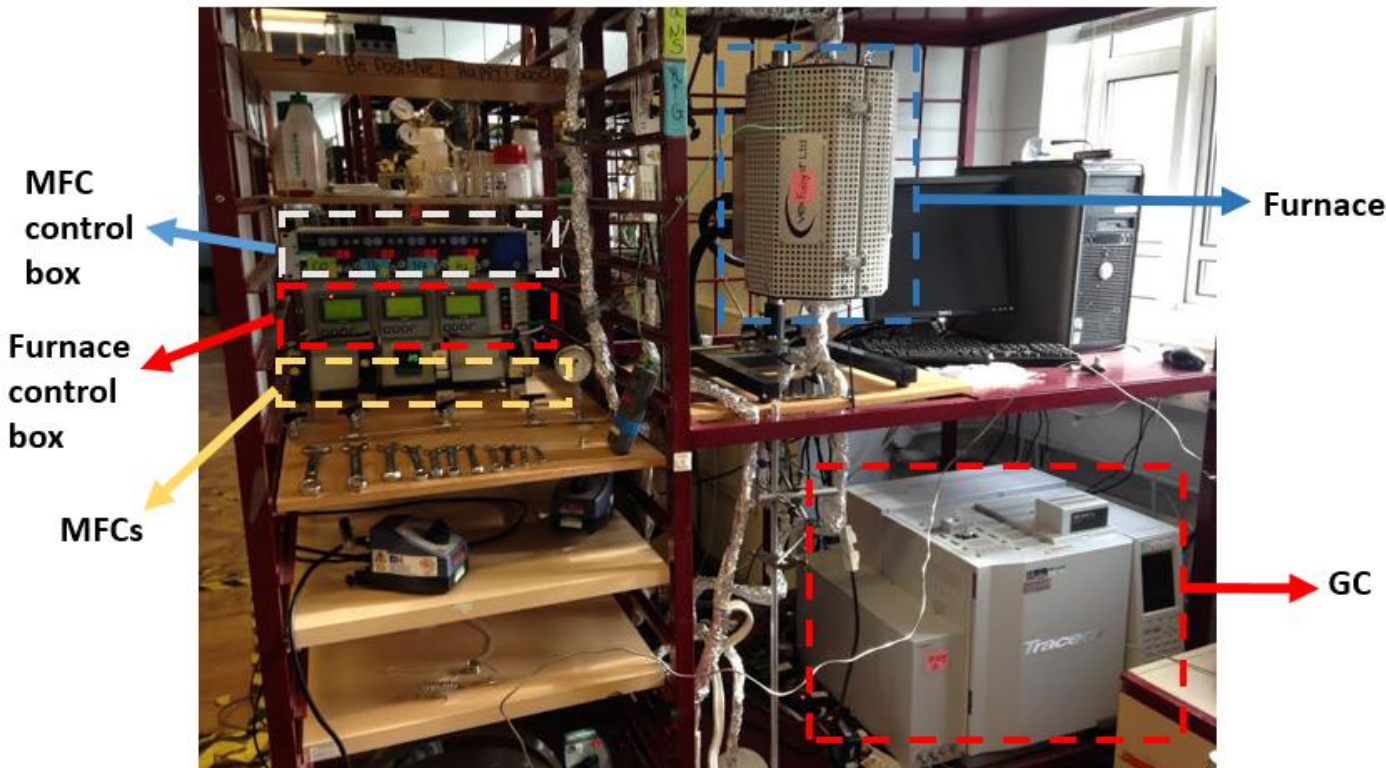
Aim: Convert to liquid fuels with lowest ΔP possible



III. Lab scale application

Objectives

1. Analyse the results in a well-defined analytical method
2. Make recommendations for the applications of improved FT
3. Investigate applicability of FT fuels in Northern Ireland



Tested catalysts

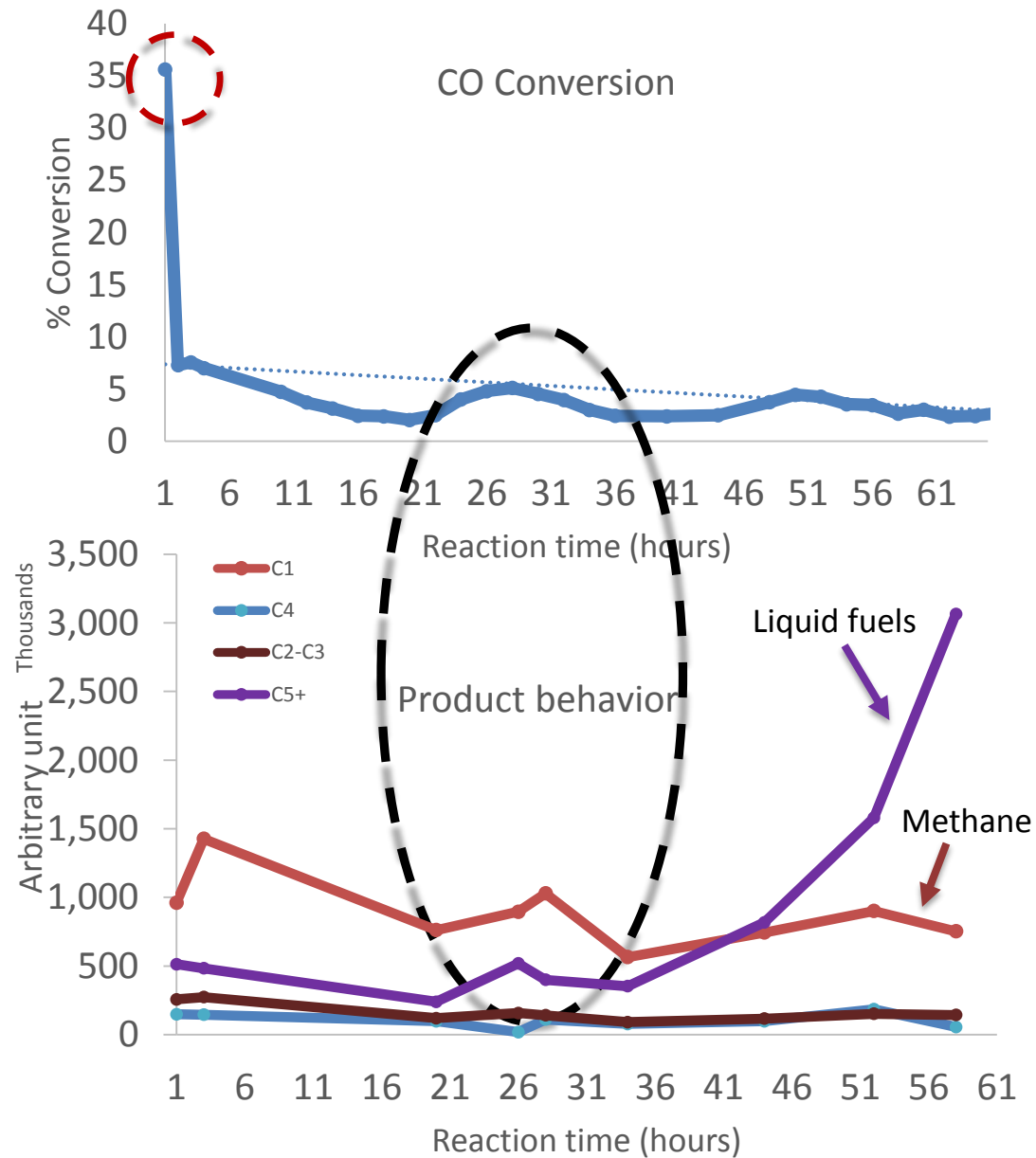
- 13.2% Co/Al₂O₃ via co-precipitation ✗
- 15.9% Co/Al₂O₃ via wet impregnation and ball milling ✗
- Commercial Catalyst ✓

*MFC: Mass Flow Controller

IV. Results

- Initial maximum CO conversion 35%
- Initial methane major product from t=1hr till t=21 hrs
- General trend methane production decreases over time
- At t=44 hrs higher hydrocarbons C5+ become major product
- Interesting regime, 44 hr induction period to reach the selectivity product distribution for FT
- Need to run for a longer period of time~1,2 weeks
- Need to analyse the used catalyst; what is on the catalyst? Wax, coke, leaching of the cobalt..etc

☺ **Liquid fuels were produced at P=1 bar and T=210°C with a higher selectivity to C5+ than CH₄ indicating potential farm scale applicability**



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Thanks for listening



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement n. 316838



Project coordinated by the QUESTOR Centre
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