EPSRC
Engineering and Physical Sciences Research Council

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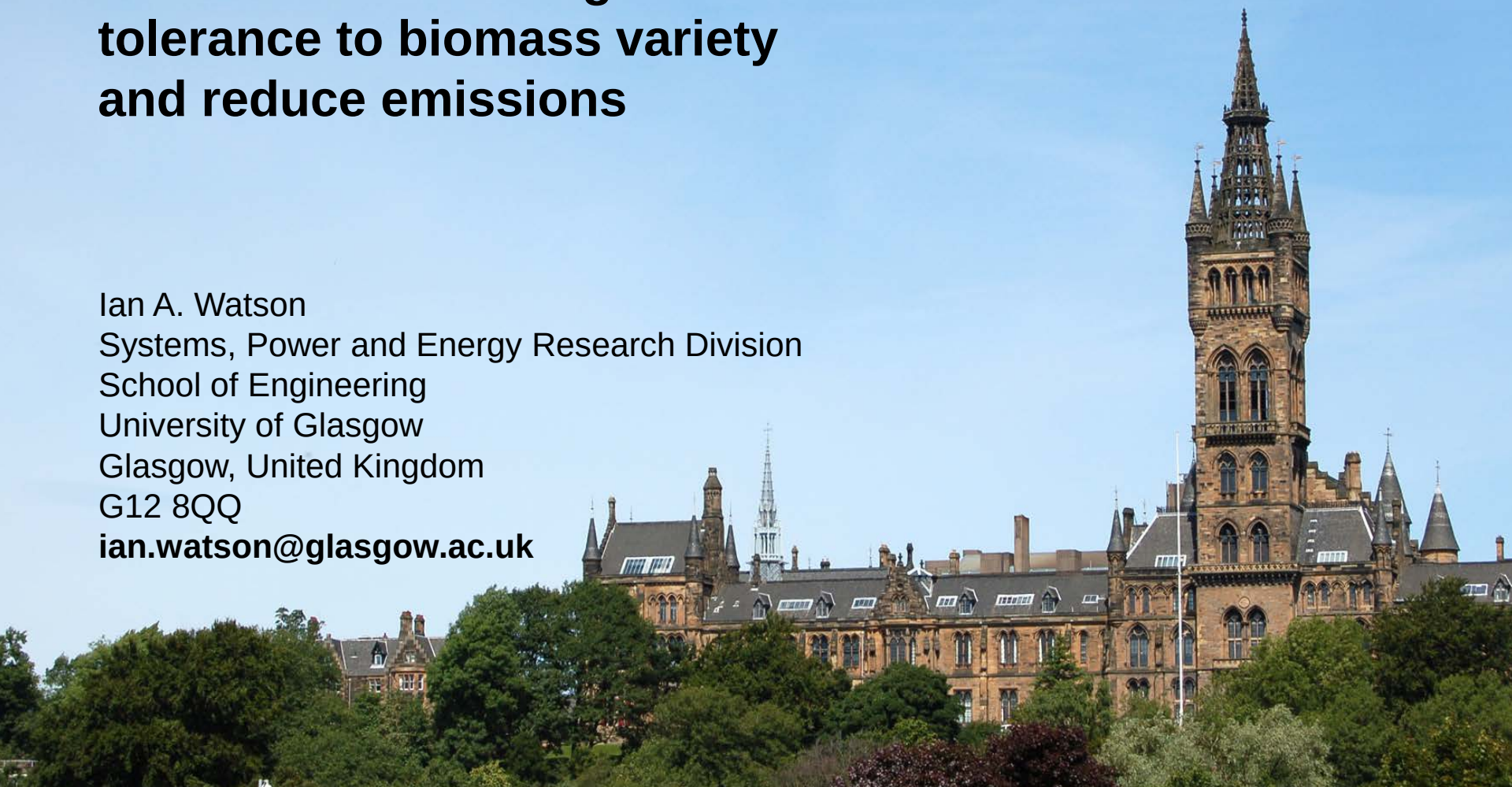
SUPERGEN Bioenergy Hub

Real time control of gasifiers to increase tolerance to biomass variety and reduce emissions



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Identifying the problems with gasification of biomass

SUPERGEN meeting at Aston, April 2014, academics
CombGEN event at Glasgow, May 2014, industry and academics
Personal communications

- Tar formation
- Biomass variety
- Feedstock uniformity
- Harvesting and biomass pretreatment variability
- Instrumentation and control

What is the effect of feedstock, processing conditions etc. on tar production and gasifier performance?
Can the gasifier be controlled and operating point optimised?
What are the techno-economic, LCA drivers/solutions?

Potential solutions and strategy

Tar formation
Operate on the minimum tar production point
Need a tar detection system
Must be robust and inexpensive

Biomass variety
Feedstock
Blending
Pretreatment

Real time control
Inexpensive, robust

LCA, Techno-economic analysis

Real time control of gasifiers to increase tolerance to biomass variety and reduce emissions

Academic:

University of Glasgow: Ian Watson, James Sharp, Nader Karimi, Manosh Paul, Zhibin Yu, Peter Hastie, Paul Younger
Aston University: Yassir Makkawi, Tony Bridgwater
Aberystwyth University: Iain Donnison
Manchester University: Paul Gilbert

Industrial support:

E.ON, OriginOil (USA), Wyse Group (UK and Ghana), gf consulting.

Real time control of gasification processes to increase tolerance to biomass variety and reduce emissions

EPSRC SuperGEN Bioenergy Challenge II
Jan 2015-Dec 2017

The project aims to investigate the effect of biomass harvest and pretreatment variables on gasification efficiency and output greenhouse gas and particulates, and to develop control systems to broaden the scope of biomass input into the system, reduce tar formation and optimise the syngas quality.

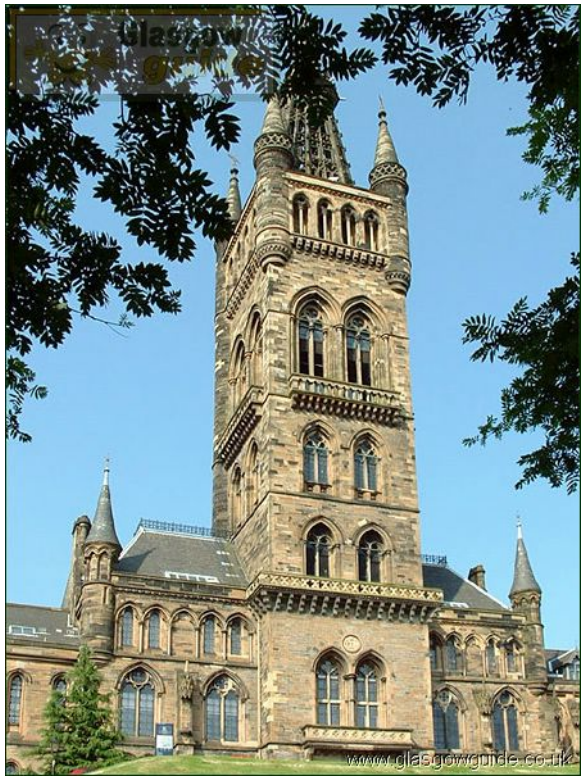
Project Outline

Workpackages:

1. Modelling gasification processes
2. Gasification system design, build and commission
3. Instrumentation and control
4. Biomass harvesting and pretreatment
5. Gasification experiments
6. GHG and deployment scenario modelling
7. Towards Implementation and scaling strategies

Conclusions

1. EPSRC funding and industrial support to look at real time control of gasifiers
2. Tar detection systems
3. Assess impact of biomass variety and pretreatment
4. Techno-economic assessment and LCA
5. Modelling and control systems
6. Small and large scale gasifiers
7. Outcomes – reduced tar formation, less downtime, broader feedstock selection



5th UK Microalgae Conference and Gasification Meeting

At the University of Glasgow,

End of June/July 2015.

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