TWO COMPLEMENTARY ANALYSIS

ULIEGE

- Potential of power-to-gas in Belgium?
- Model that captures a lot of details of the Belgian energy system

VLERICK

- Impact of power-to-gas on electricity and gas markets?
- Model that captures market interactions in a stylized energy system

*Extended abstract accepted for presentation at Global Annual Conference International Association Energy Economics, June 2019*
First finding: In scenarios in which there is a potential for power-to-gas, both markets benefit, electricity more than gas
**Second finding**: Power-to-gas sets the electricity market price in hours where otherwise the price would have been zero; this reduces the need for RES premiums.
Mixed Complementarity Model 1.0.
- Electricity and gas market coupling with investment in power-to-gas
- Investment (annualized fixed cost) and operation (variable cost) of power plants
  - 2 conventional power generation technologies
  - 1 renewable electricity technology with RES target
- Gas supply via long term contracts (procurement cost function)
- No electricity nor gas network constraints
- 10 demand periods (876 hours) in electricity (slope) and gas (flat)

Mixed Complementary Model 2.0.
- Increase level of detail of electricity and gas market
- Study interaction between renewable electricity and renewable gas targets and support schemes
Third finding: Renewable target (55-100%)

- Confirms findings ULiege: power-to-gas has potential in scenarios with high CO2 reduction targets or high renewable targets
- Additional remark: if RES target really high, cost of power-to-gas less important; for lower RES targets, cost of power-to-gas important driver (0 – 1000 €/kw)

Fourth finding: Renewable availability (10-30%)

- More spillage and more power-to-gas investments if renewable availability is negatively correlated with load and/or when load duration curve is steeper
- Investment in power-to-gas increases if the average availability is reduced, even though spillage does not increase if we only change the average