Design as enabling factor for retrofit of buildings using complementary local financial circuits

Prof Lubo Jankovic

Director, Zero Carbon Lab

BIRMINGHAM CITY University

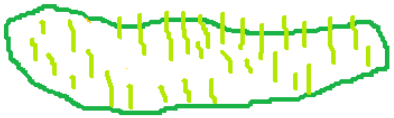
There are numerous buildings like this in the UK

- Solid wall construction ‘Wimpey no-fines’, 300 mm concrete
- Thermal imaging confirms the absence of thermal insulation

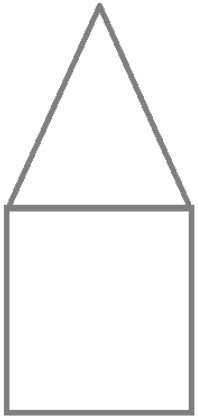
Retrofit to zero carbon

- Buildings like this will need to undergo deep retrofit as part of the effort to decarbonise the planet
- Ad-hoc solutions are no longer acceptable
- Detailed analysis that involves a small number of alternatives is also no longer acceptable
- Environmental design of buildings needs to undergo a step change
- Not enough of conventional finance for the required number of retrofits
- A combination of advanced design and complementary finance offers opportunities for finding a new way forward

Historic example from French city Saint-Omer

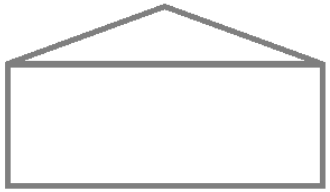


Land



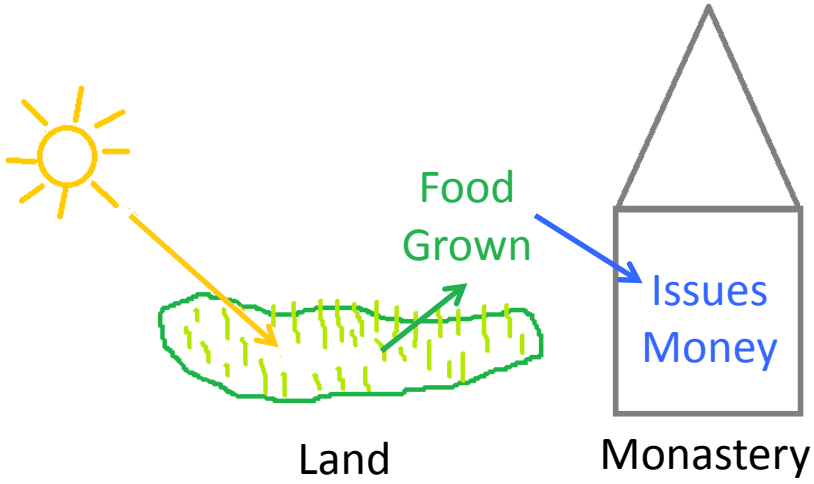
Monastery

Workman

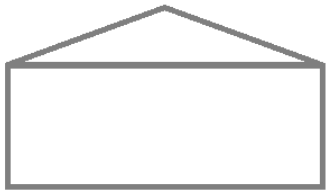


Inn

Historic example from French city Saint-Omer

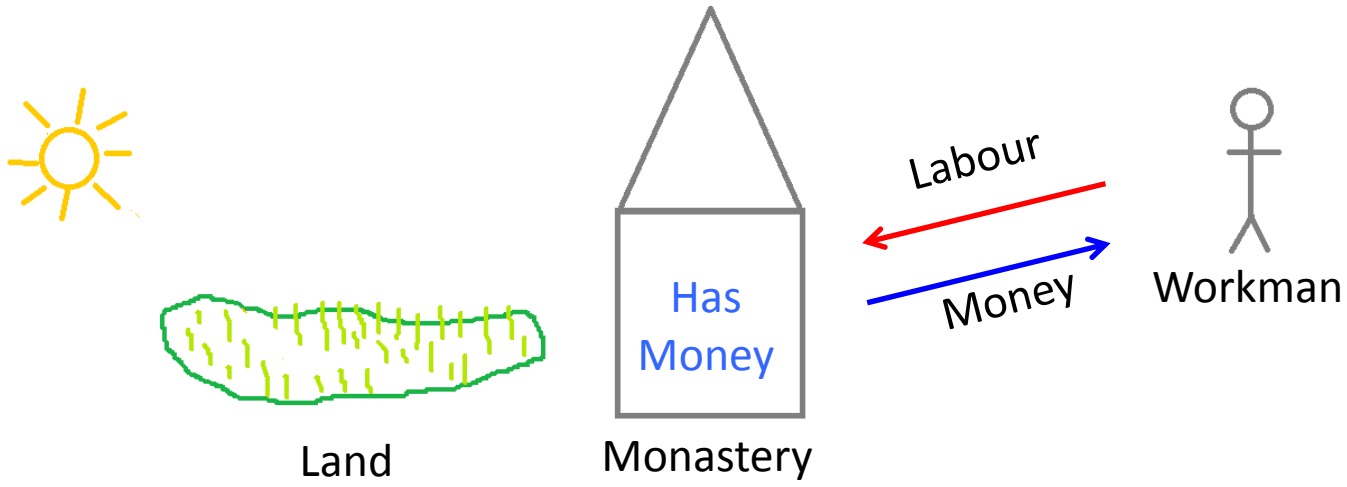


Workman

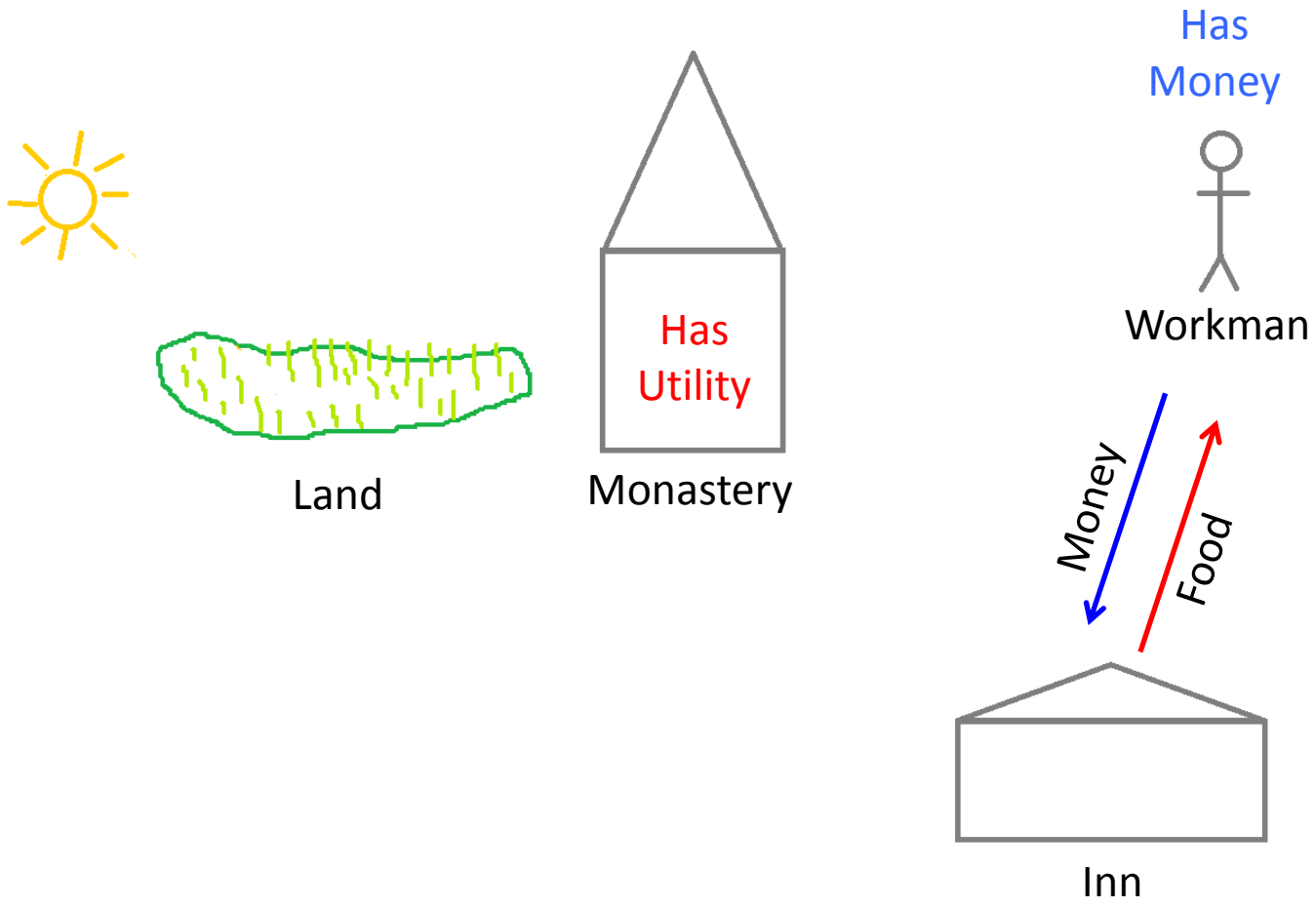


Inn

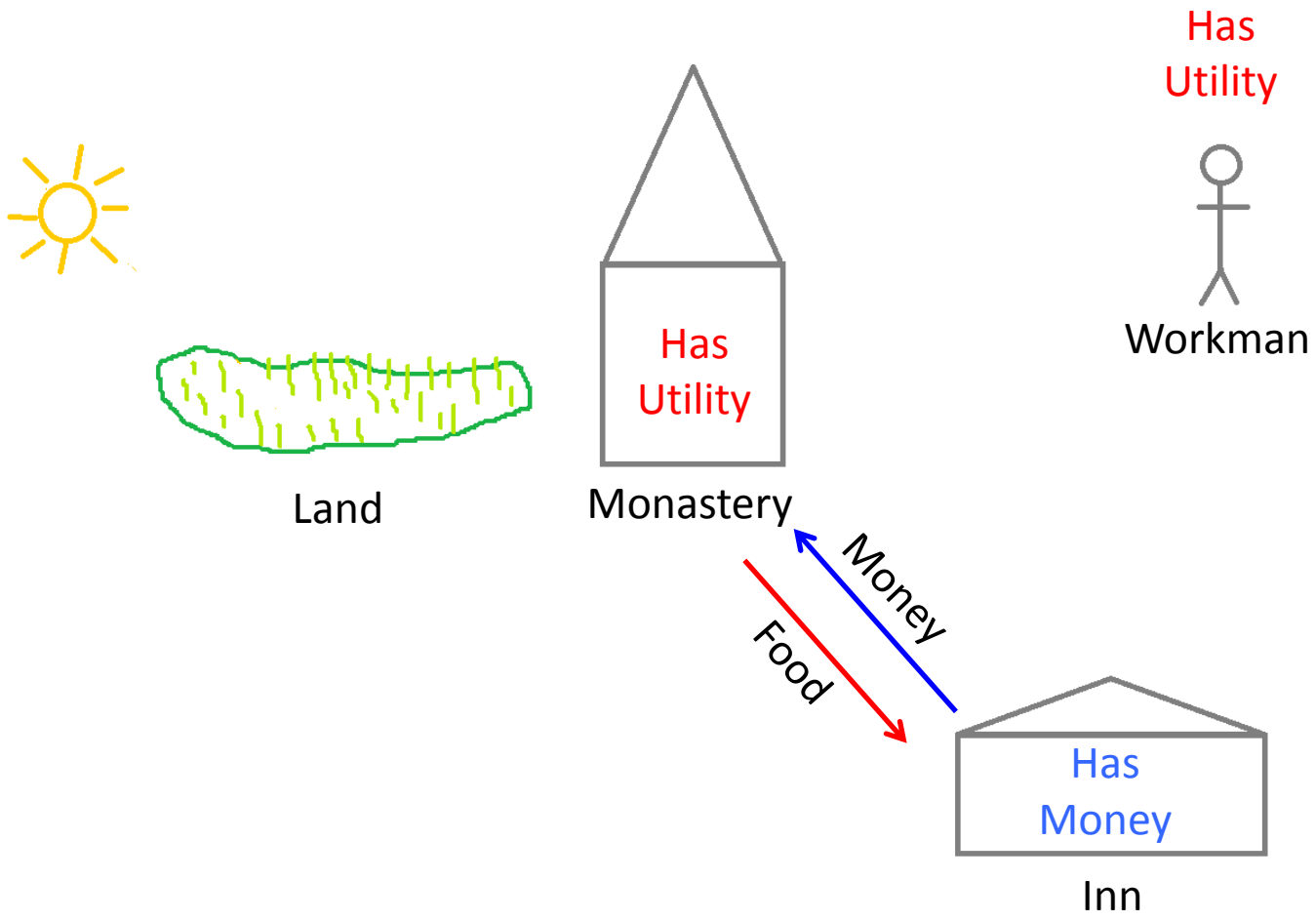
Historic example from French city Saint-Omer



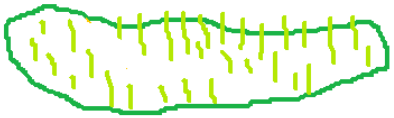
Historic example from French city Saint-Omer



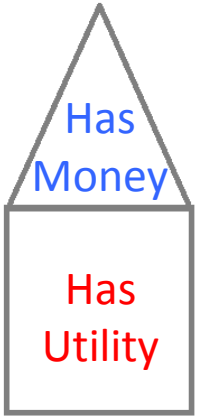
Historic example from French city Saint-Omer



Historic example from French city Saint-Omer



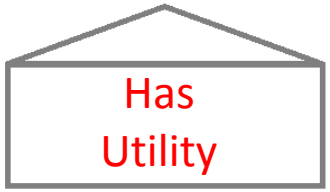
Land



Monastery

Has
Utility

Workman



Inn

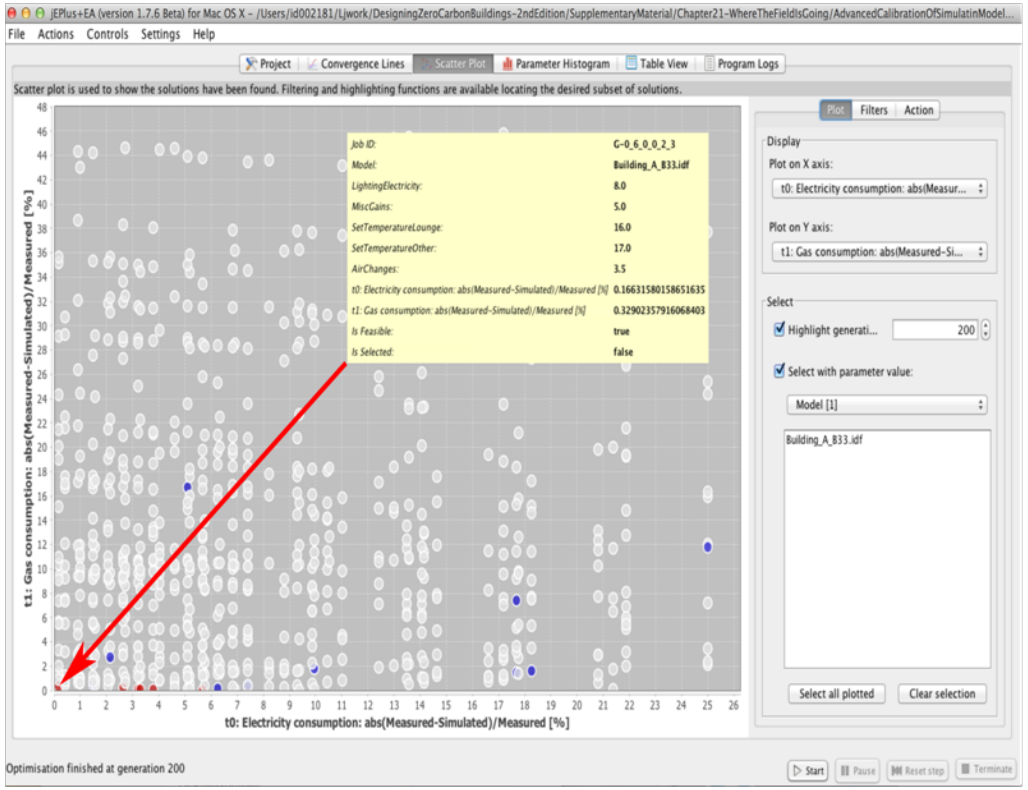
Retrofit to zero carbon

- Not enough conventional finance
- Calibration of the base model of the building to be retrofitted
- Optimisation to reduce the threshold for entry of complementary finance

Retrofit to Zero Carbon – Calibration

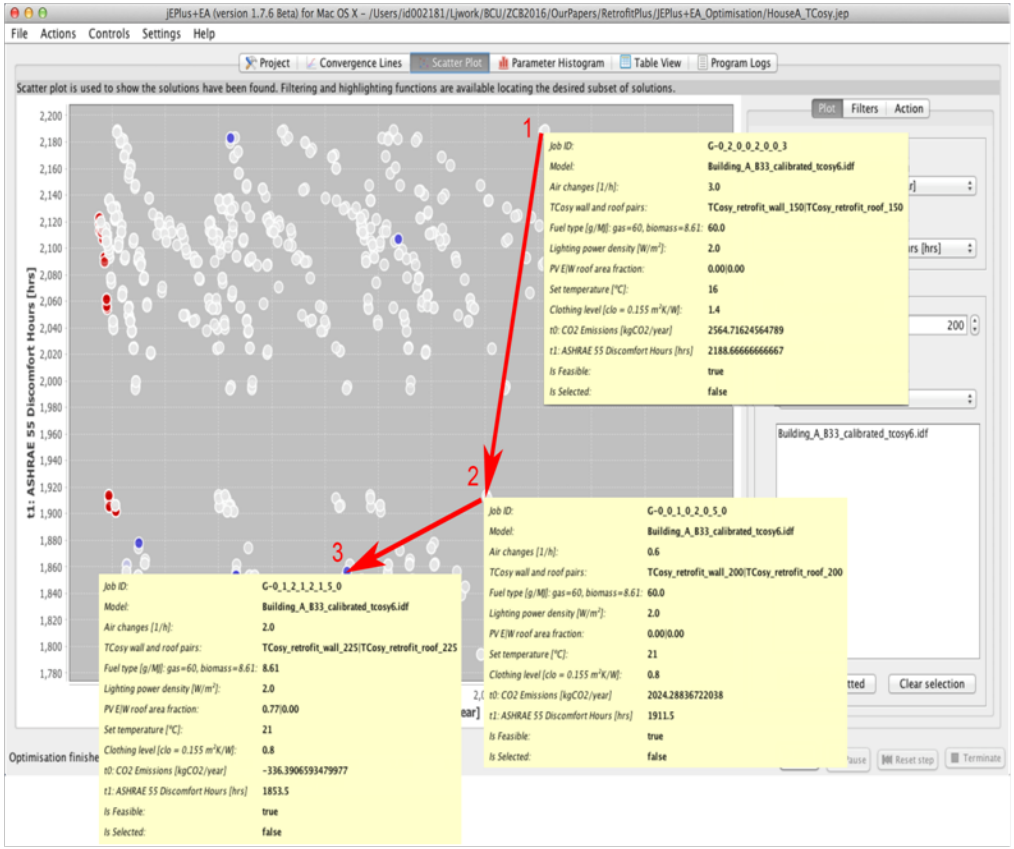
- The point closest to the origin of the coordinate system represents the simulation model with the most accurate performance

- The errors of the calibrated model were 0.17% in respect of electricity consumption and 0.33% in respect of gas consumption

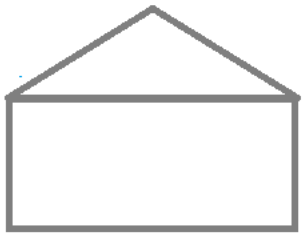


Retrofit to Zero Carbon - Optimisation

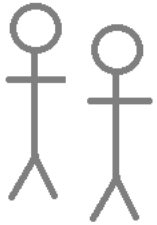
- Numerous results were obtained in the form of a scatter plot
- Analysis of the scatter plot and corresponding parameter sets was carried out
- This determined a journey from a minimum intervention to zero carbon
- This approach reduces the entry threshold for complementary currency



What could the complementary currency be?

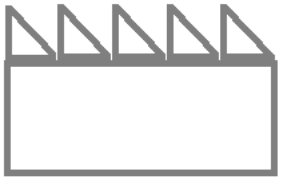


Housing Association



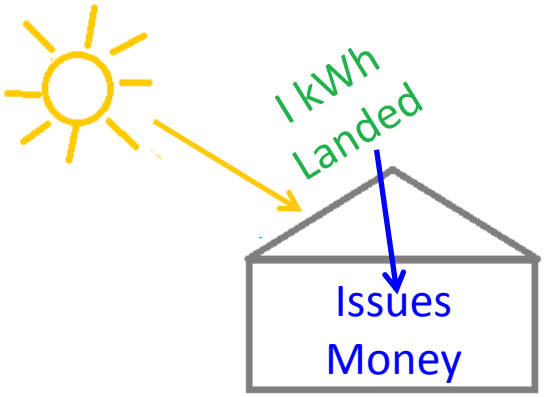
Retrofit Provider

Householder

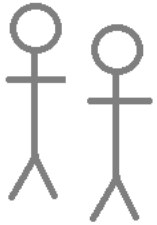


PV Manufacturer

Complementary currency = 1 kWh?

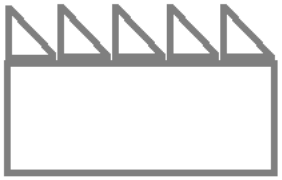


Housing Association



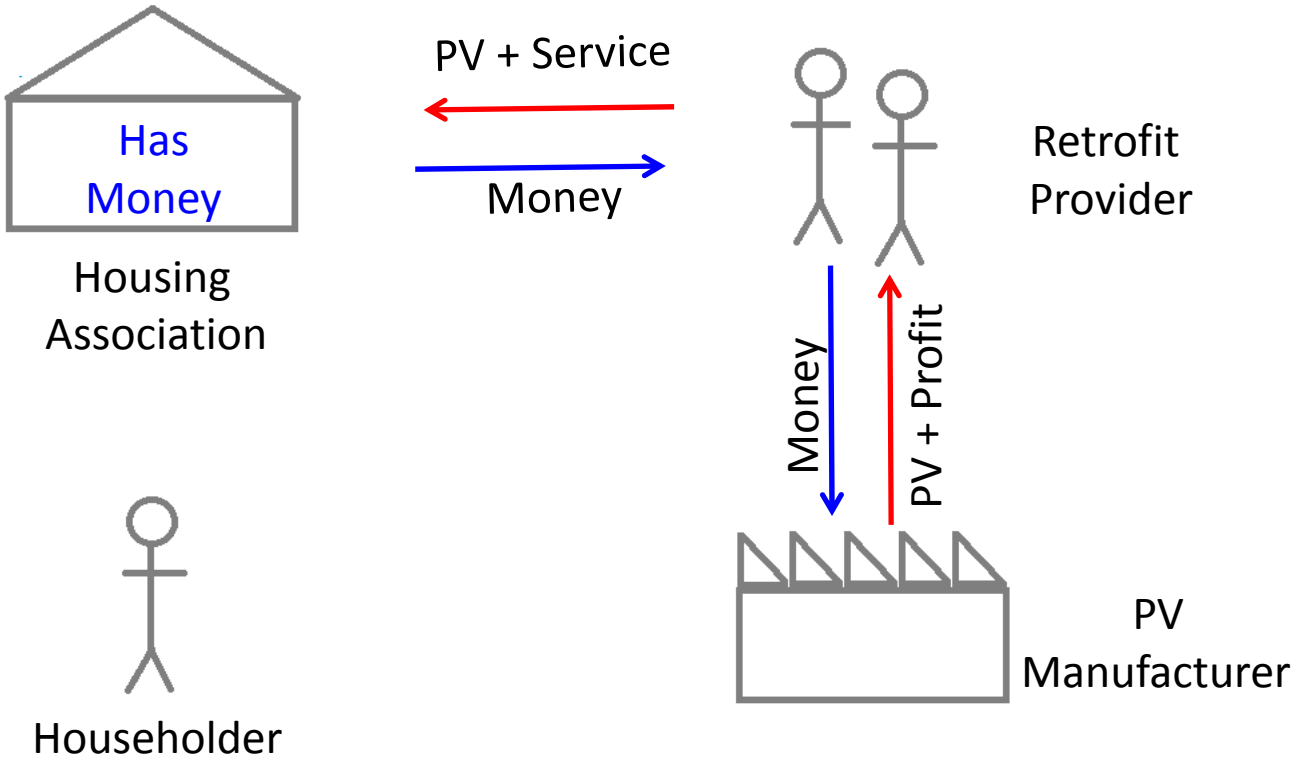
Retrofit Provider

Householder

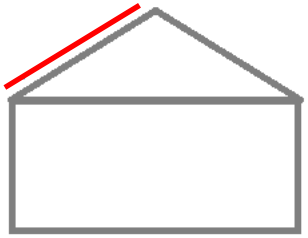


PV Manufacturer

Complementary currency = 1 kWh?



Complementary currency = 1 kWh?



Housing Association

Surplus Energy

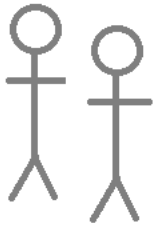
Householder

Has Debt Energy

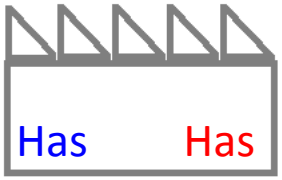
Money

Energy

Has Income

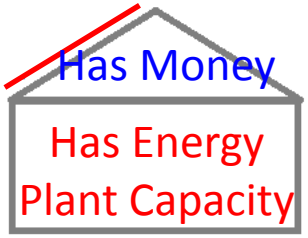


Retrofit Provider



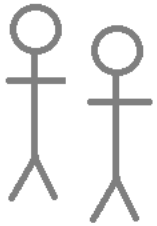
PV Manufacturer

Complementary currency = 1 kWh?



Housing Association

Has Income



Retrofit Provider

Householder

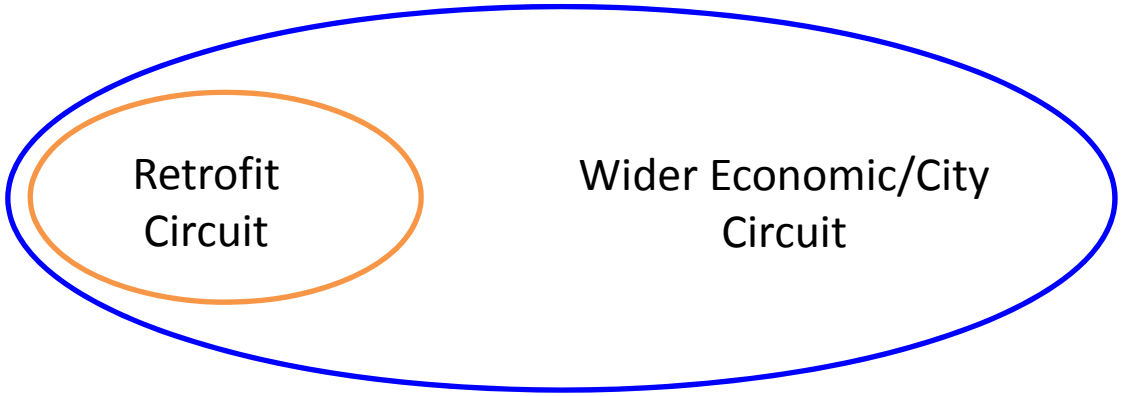
Has Energy Service

PV Manufacturer

BIRMINGHAM CITY University

Complementary currency = 1 kWh?

- Wider economic circuit is needed to achieve critical mass



Conclusions

- Not enough of conventional finance for the required number of retrofits
- A combination of advanced design and complementary finance offers opportunities for finding a new way forward
- Wider economic circuits are needed to achieve critical mass