

Electrification Of Residential Heating - Modelling the Implications.

Paul Deane, Denis Dineen, Paul Gallagher, Alessandro Chiodi, Maurizio Gargiulo, **Brian Ó Gallachóir**

IEA ETSAP Workshop
Paris June 17 2013



Electrification of Residential Heating - Good Idea or Bad Idea?

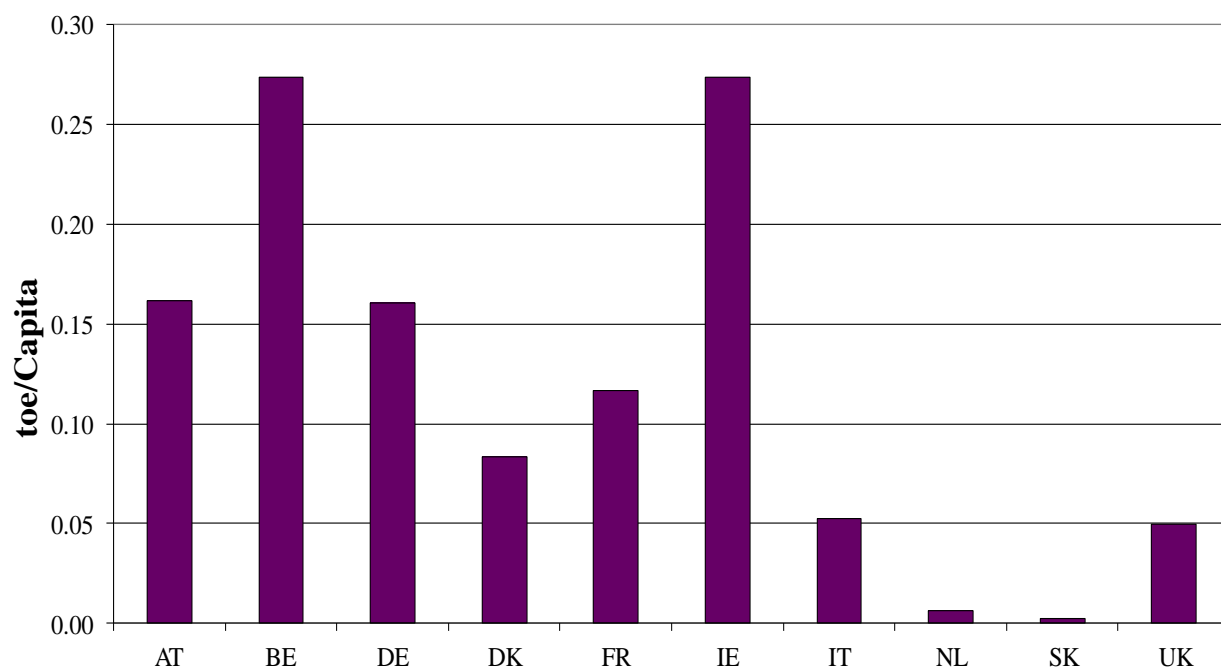
- **Context**
 - Legacy Housing stock
- **Methodology**
 - Soft linking TIMES – PLEXOS – DEAP
- **Technology Focus**
 - ASHP and Smart Storage Heaters
- **Opportunity**
 - Demand side management, Emission reduction, Targets



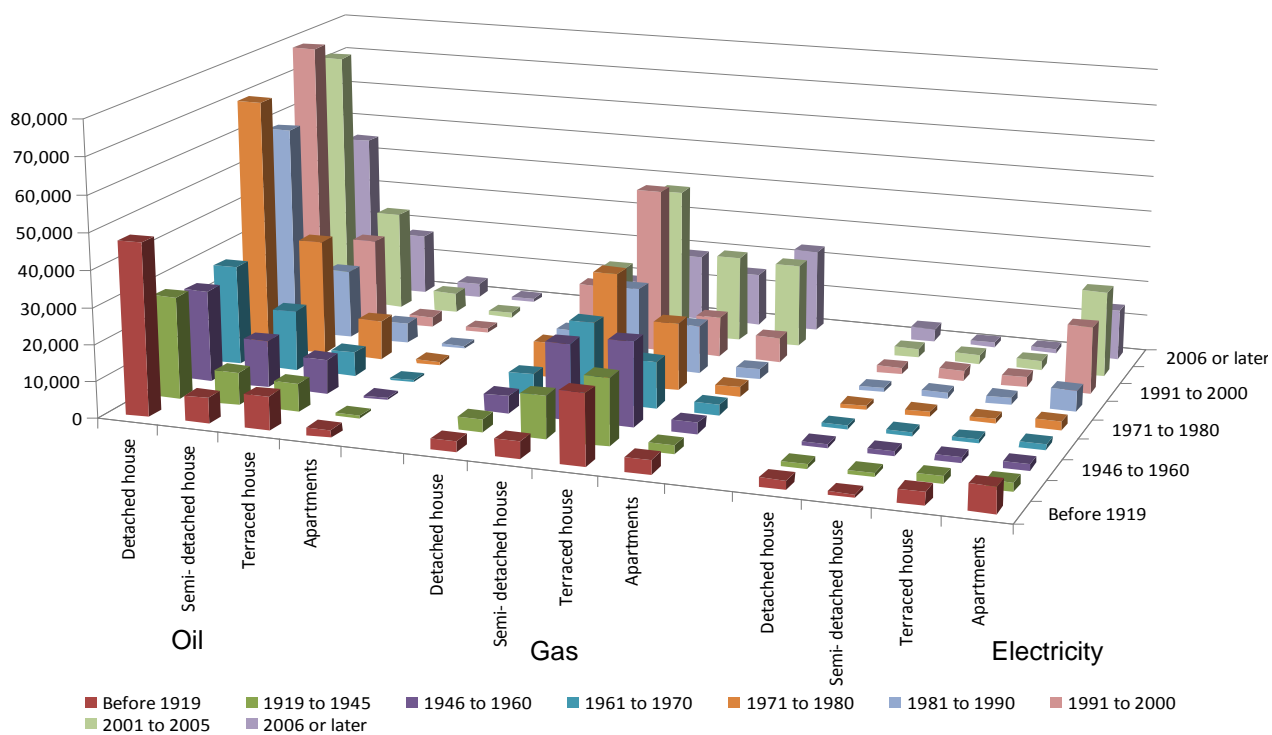
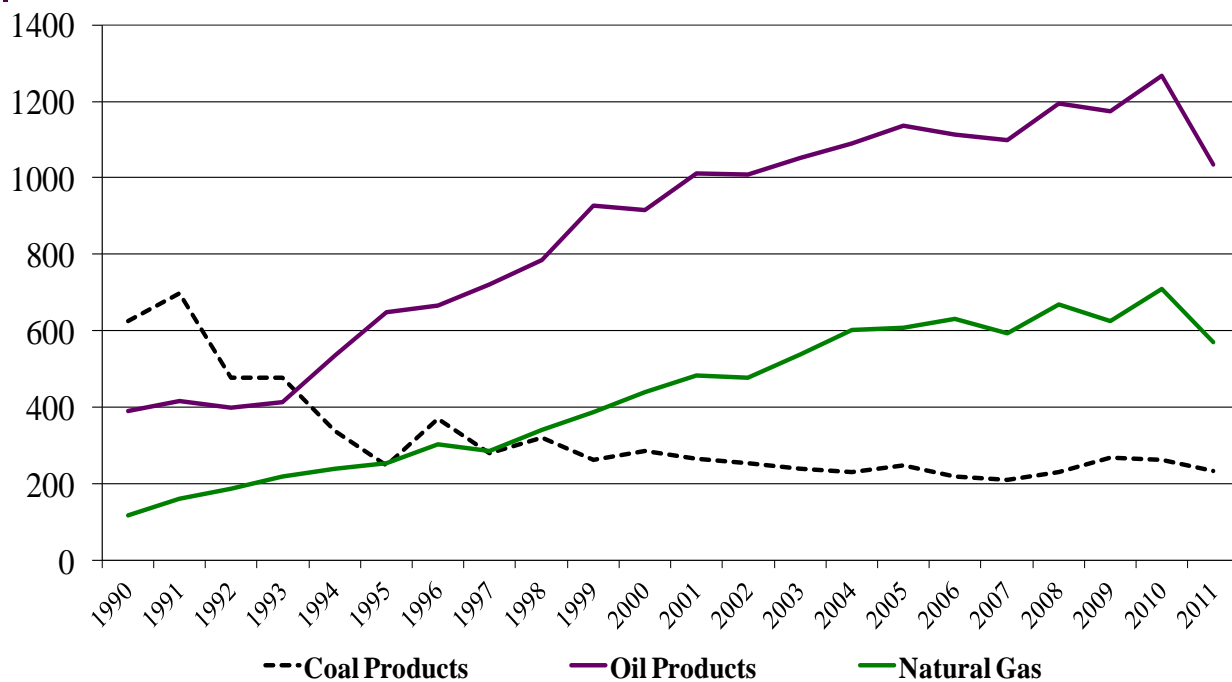
Context-Ireland



Residential Oil Usage 2010



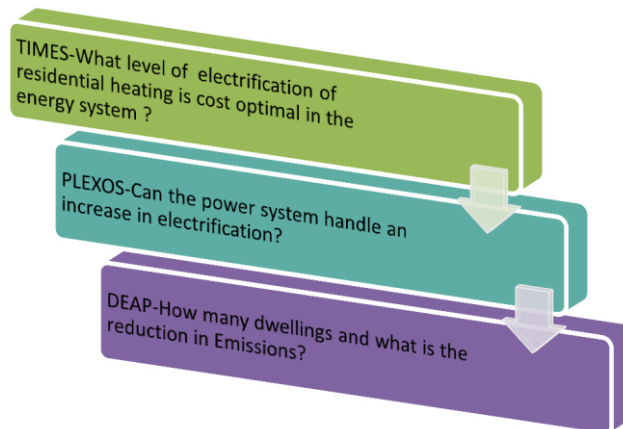
Residential Fuel Use (Ktoe)



Methodology – Soft Linking



Different questions – Different models



• TIMES

- Non ETS Targets
- Full System Analysis
- Heating technologies

PLEXOS

Smart Meter Data
EirGrid GAR/DS3 inputs
15 min chronological model

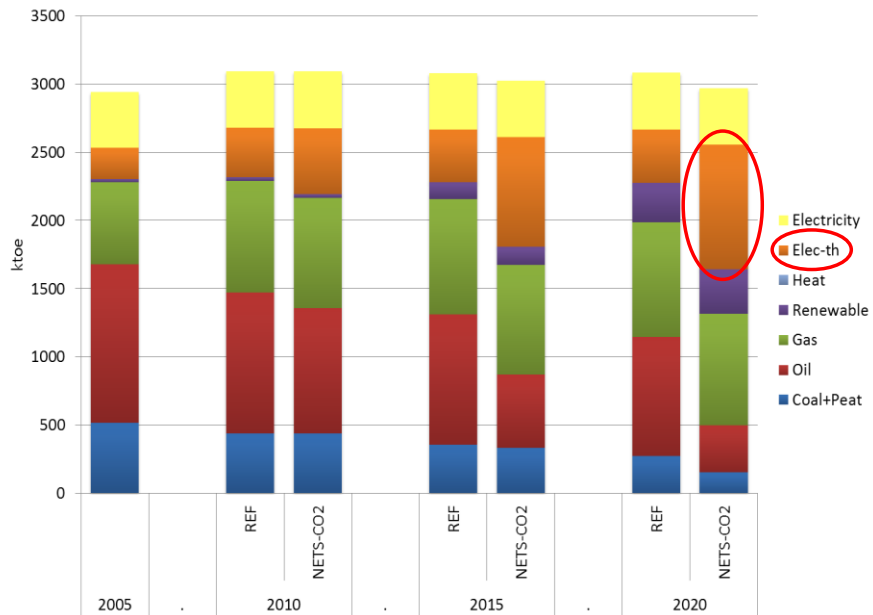
DEAP

Heat Pump technology
Housing stock model

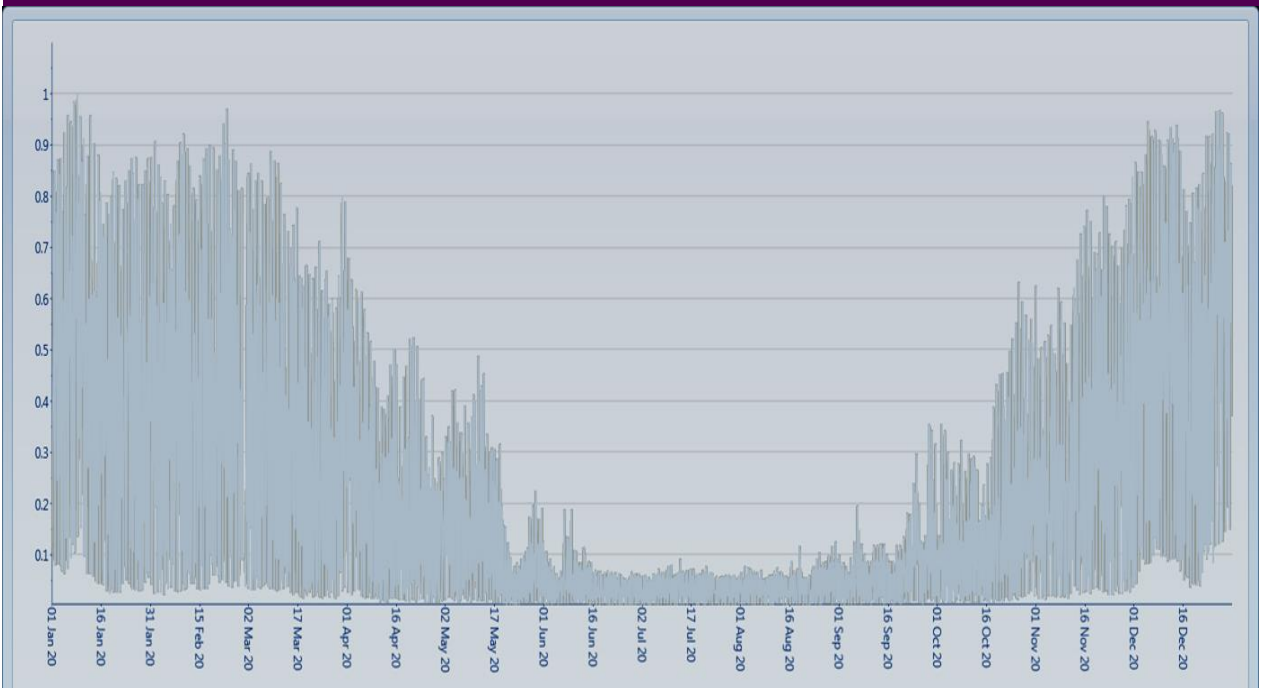
Emission reduction



Irish TIMES non-ETS Scenario to 2020



Smart Meter Gas Trials -> ½ hourly normalized Heating profile- PLEXOS



Modelling-Results

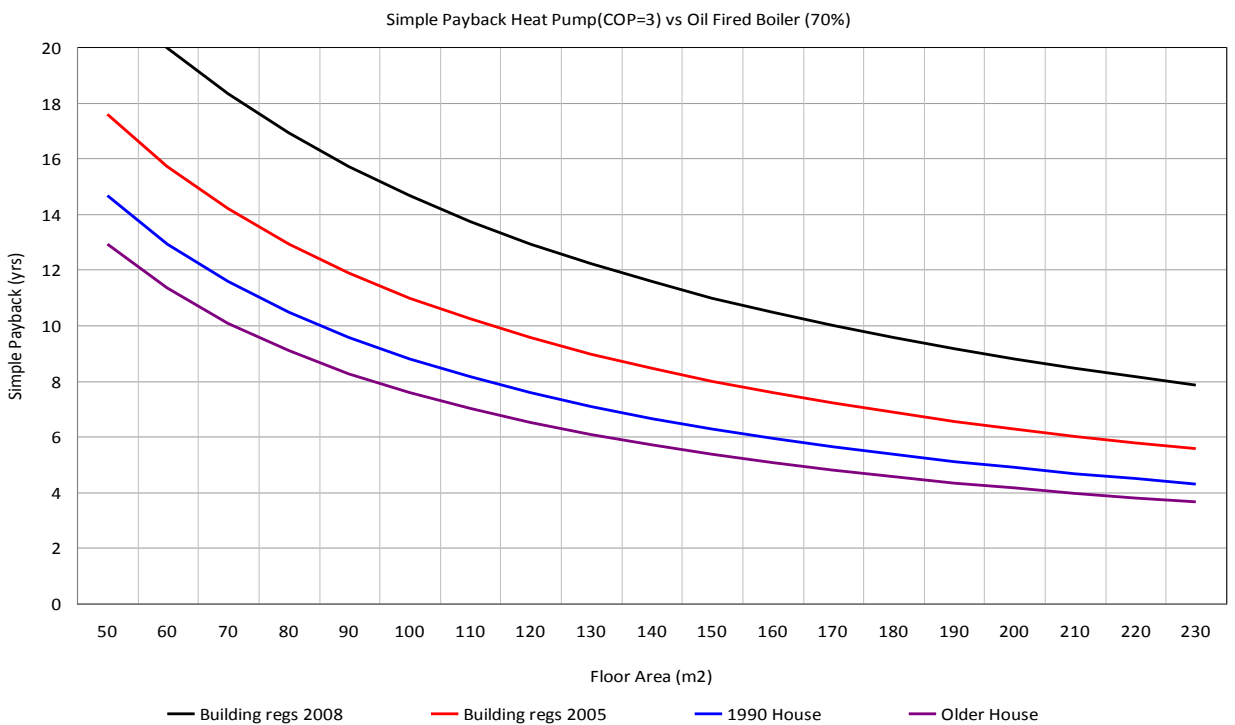
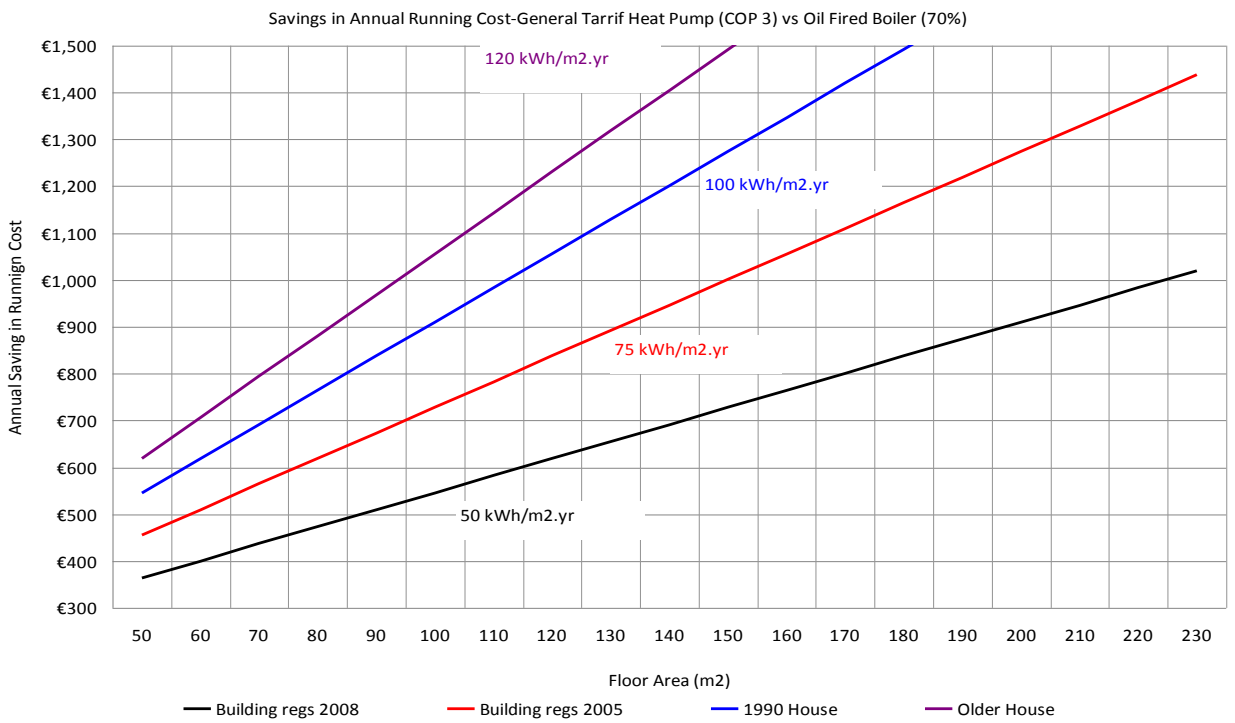


Replace Old Oil Boiler with New ASHP/Storage Heater

Air Source Heat Pump Electrical Installed Capacity	1000 MW	Smart Storage-500 MW
Annual Heat Pump Electric Load (GWh)*	1,696	849
Heat Pump COP	3	-
Annual Delivered Heat (GWh)	5,087	849
Emissions due to delivery of heat (tonnes) [ETS Sector]	1,022,096	314,324
Oil Fired Boiler Equivalent Delivered heat CO2 Emissions (tonnes) [Non-ETS Sector]	1,815,822	303,129
Net Saving in CO2 Emissions (tonnes)	793,726	-11,195
Approximate number of 'typical' Dwellings (energy)	254,356	53,077
Contribution to RES-H (%)*	6.71%	-

* LOLP tested





Conclusions

Large reliance currently on Oil in residential sector in Ireland.

Modelling using the appropriate tool for the question at hand

TIMES - how much electrification?

PLEXOS – what can the power system handle?

DEAP – how many and which houses?

Reliability of Power System is crucial (8 hours LOLP p.a.)

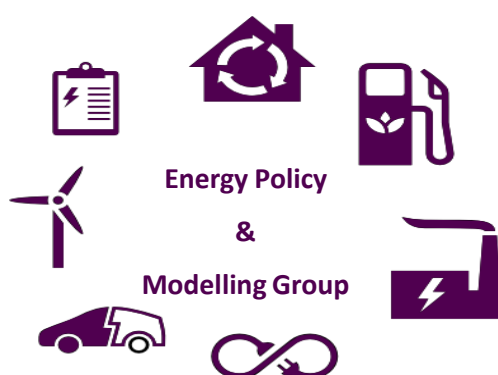
Overestimation of Electrification Potential in Irish TIMES

Policy implications (Gasification and electrification)

ASHP contribute towards Non ETS target and RES-H targets



Energy Policy & Modelling Group



Energy Policy and Modelling Group on

