



Evaluation of Energy Efficiency program in Geneva

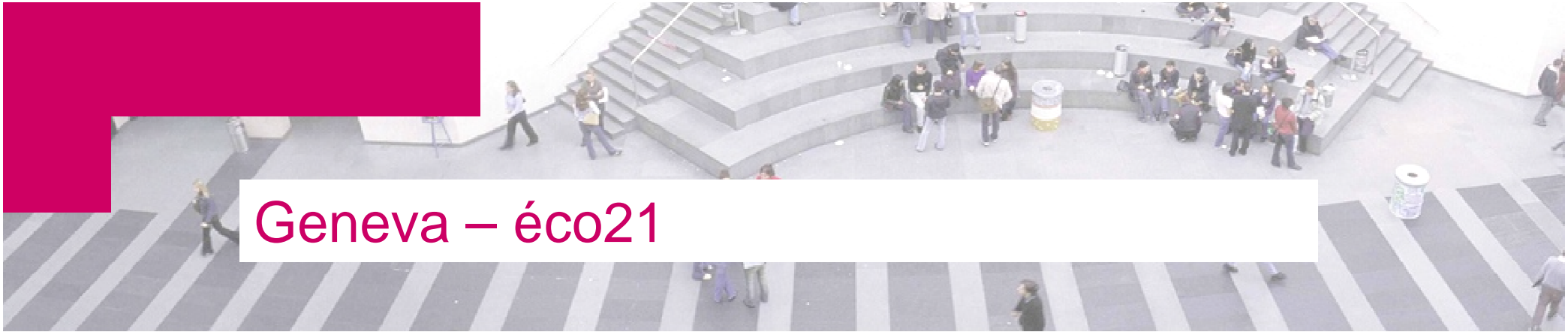
Evaluation methodologies for two subprograms using bottom-up approach

Daniel Cabrera – Theodora Seal



**UNIVERSITÉ
DE GENÈVE**





Geneva – éco21



Population : 460'000 inhabitants



Electricity consumption : 2'850 GWh/year



Utility provider : Services Industriels de Genève



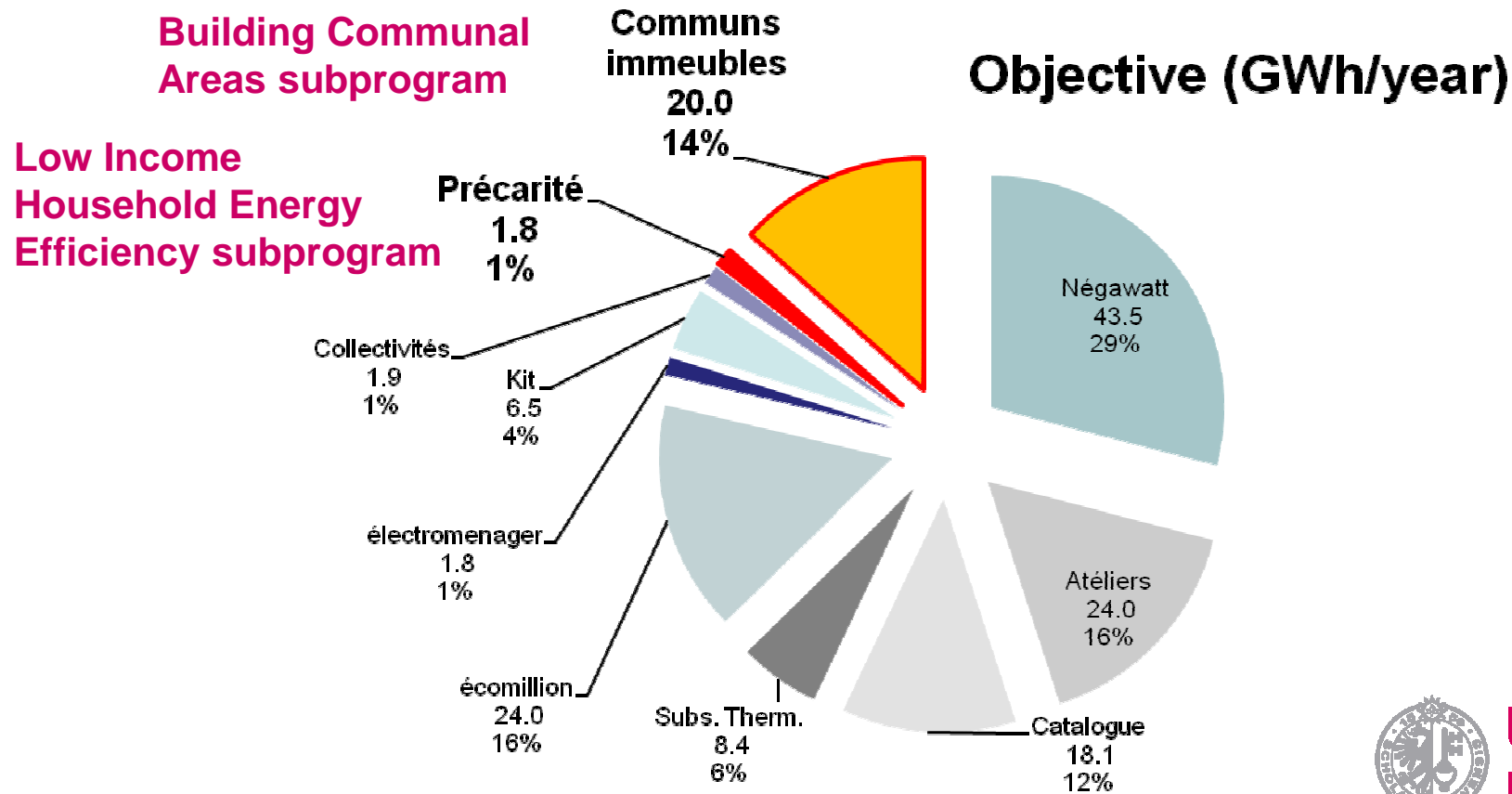
Energy Efficiency Program (electricity) : éco21



Evaluation Methodology : University of Geneva



éco 21 – Subprograms – objective share





Low Income Household Energy Efficiency subprogram (précarité) - Description

Favor the implementation of energy efficient technologies in low income households.

Objective : 1.8 GWh/year by end 2013

Target : 4 500 households

~ 400 kWh/year/household





Building Communal Areas subprogram (communs d'immeubles) - Description

Common areas of buildings represent a large potential for electric energy savings; all the more since the local regulation no longer requires 24 hour per day lighting in building common spaces.

Objective : 20 GWh/year by end 2013

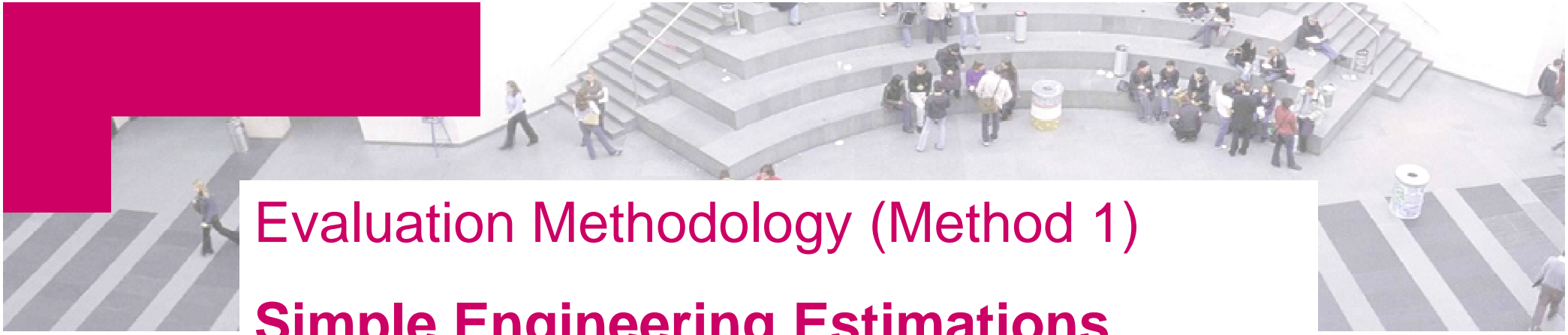
Target : 5 000 projects

~ 4 000 kWh/year per project



**UNIVERSITÉ
DE GENÈVE**





Evaluation Methodology (Method 1)

Simple Engineering Estimations



Power of removed equipment



Power of installed equipment

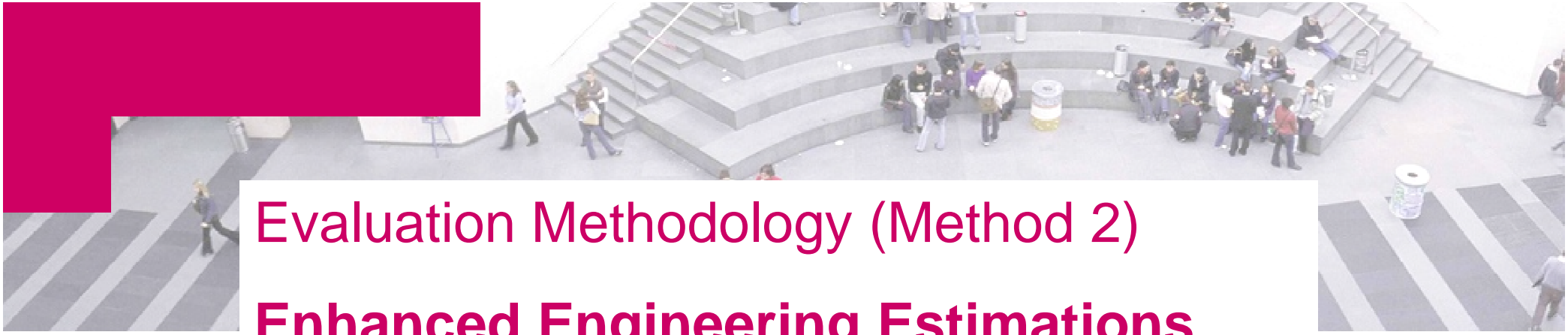


Operating hours



**UNIVERSITÉ
DE GENÈVE**

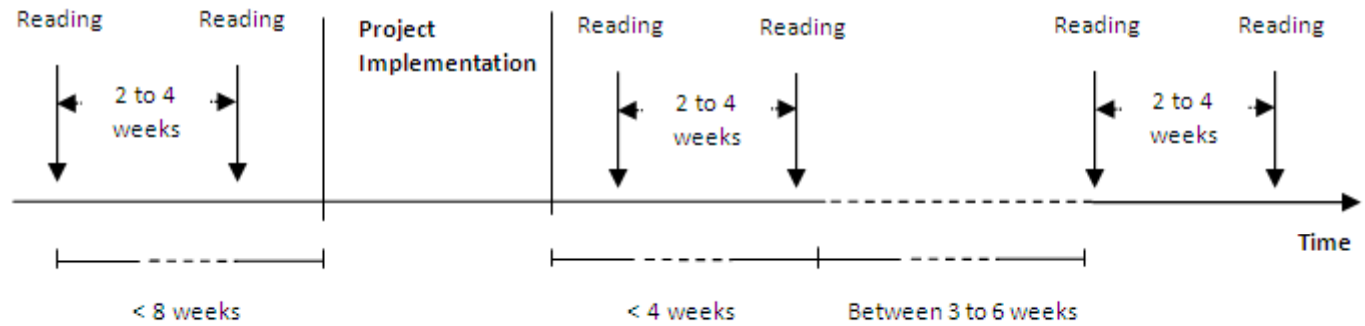




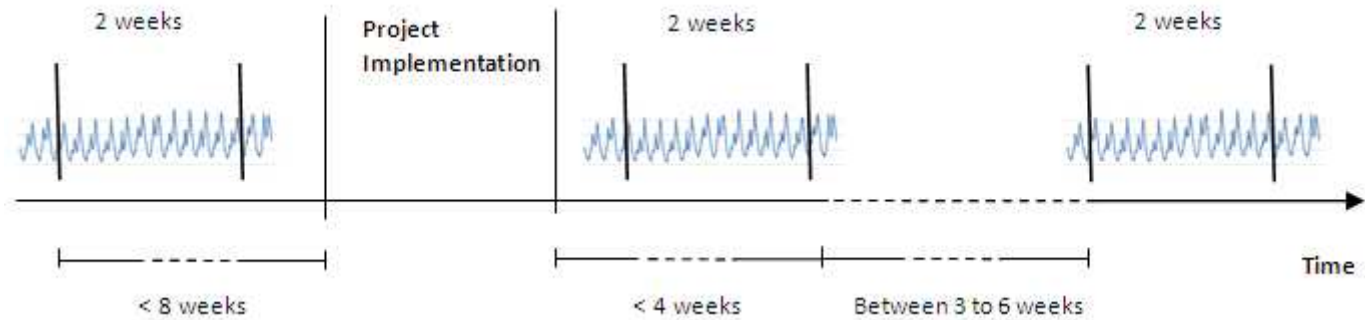
Evaluation Methodology (Method 2)

Enhanced Engineering Estimations

Utility meter readings

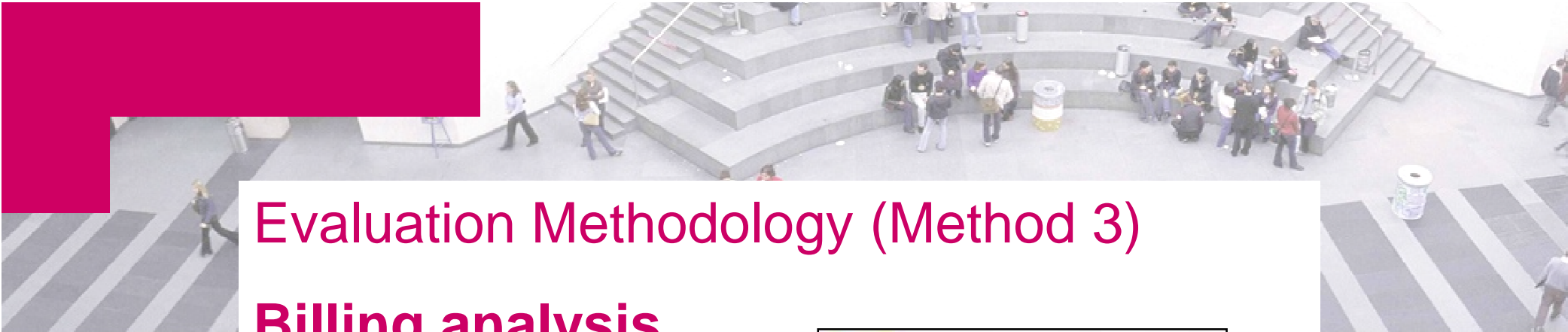


Load profiles



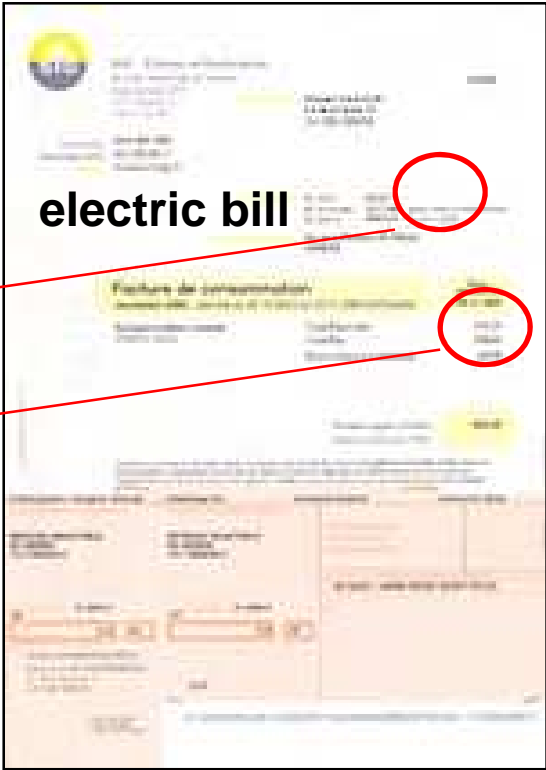
**UNIVERSITÉ
DE GENÈVE**





Evaluation Methodology (Method 3)

Billing analysis



Reading dates

kWh consumed



**UNIVERSITÉ
DE GENÈVE**





Low Income Household Energy Efficiency subprogram (précarité) – Case Study 1/2

504 households
336 participants

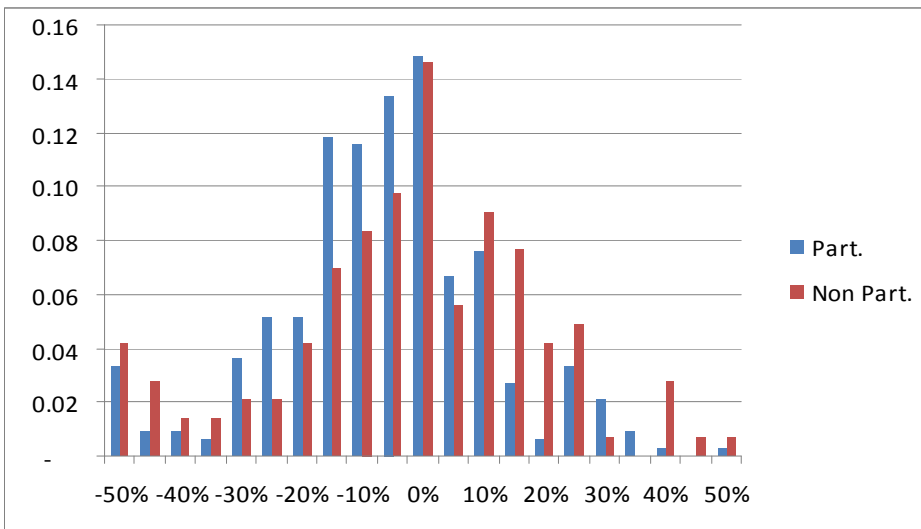
~ 2900 lights bulbs
~400 energy saving extension leads
~80 halogen lamps
~90 refrigerators



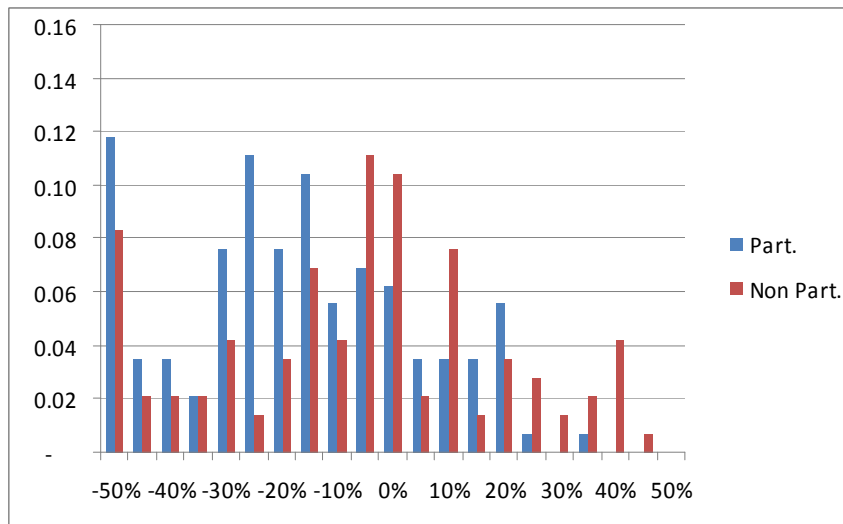
**UNIVERSITÉ
DE GENÈVE**



Low Income Household Energy Efficiency subprogram (précarité) – Case Study 2/2



distribution just after implementation



distribution 4 months after implementation

Energy savings ~ 350 kWh/year/household (i.e. 13% reduction)

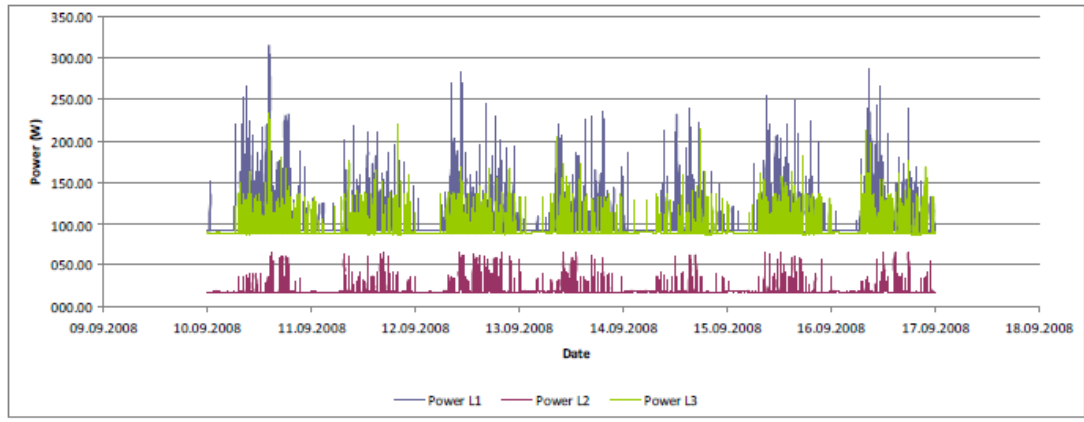


**UNIVERSITÉ
DE GENÈVE**

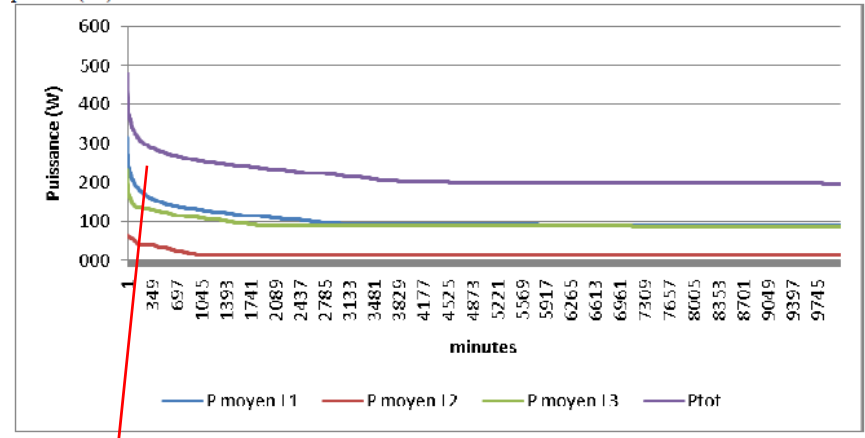




Building Communal Areas subprogram (communs d'immeubles) – Case Study A



Load curve – 3 three power phases



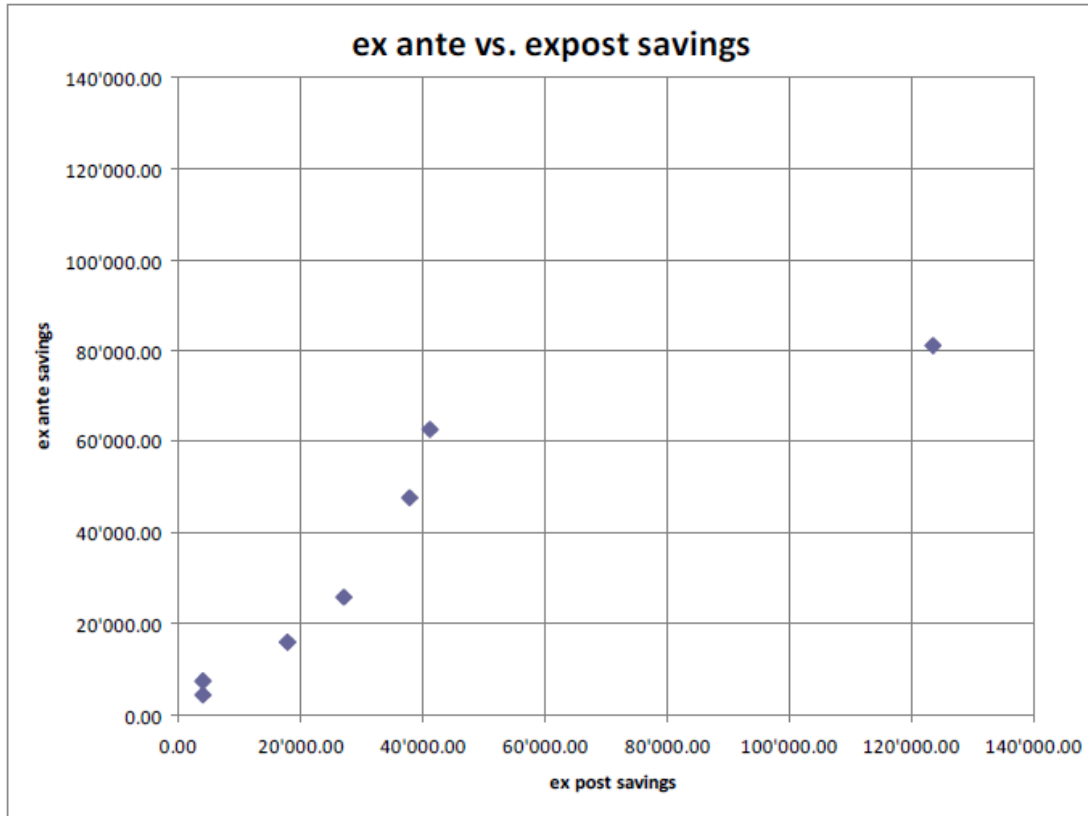
monotonic load curve – 3 phases + total

Average daily Operating hours = 1 hour 10 minutes





Building Communal Areas subprogram (communs d'immeubles) – Case Study B



ex ante estimations (method 1) made by the electricians is not far from the ex post calculations (method 3); the average difference amounts to 4%

However, if we make the same comparisons site by site, the differences go from -35% to +81%.

Energy Savings ~11 MWh/year/project



**UNIVERSITÉ
DE GENÈVE**





First results

At project level:

The enhanced engineering estimations are close to the simple engineering estimations. A few additional enhanced engineering estimations should be enough to improve the original hypotheses on the simple engineering estimations enabling to use the latter - more time and cost effective - alone in the future.

At program level:

The results obtained from these first experiences can be used to improve the original estimates of the goal and target of the two subprograms.



**UNIVERSITÉ
DE GENÈVE**



Thank you

www.eco21.ch/

<http://www.unige.ch/energie/energieforel.html>