

2008 tariffs scenarios and modelling

Scope and methodology

Scope of work

The scope of this report is to assess

- Testing and verification of the accuracy of 'source data' used in the model, including testing of historic billing / consumption data; data relating to number of persons per household; and information reported in accounts and used as a basis for inclusion of costs in the model
- Testing the effectiveness of the 'eco reduction mechanism' and quantifying the number of households which will actually benefit from the 'eco reductions'.

These issues have been highlighted in the High level review of the proposed changes to utility retail tariffs.

Methodology

Historic consumption data was used to simulate water and electricity bills for at least one full year, recalculated assuming 95% surcharge and simulated using the 2008 tariffs.

Process

- Understanding of tariff
 - Working out bill for any consumption and circumstance
- Consumption patterns
 - Creation of reference database
 - Number of accounts in each consumption range
- Comparison with previous tariff based on last available consumption
 - At 95% surcharge
 - Differences between simulated and recalculated bills

Process 2

- Dummy billing run:
 - To determine revenue and sensitivity to energy efficiency/conservation
 - Consumption as at 2006/7
 - Consumption as at 5%, 10% less for revenue sensitivity purposes
 - Consumption randomly 0 to 10% less for revenue sensitivity purposes

Creation of reference data set - 1

Source of information

- The analysis was mainly based on a table that covered all invoices issued between April 2006 and December 2007, together with a table that details all claims in these invoices. Records related to 1,514,395 invoices, containing 7871361 items that make up the bill (claims). These cover a period of between 500 and 700 days for each account. 'Provisional' invoices were not included in the set

Characteristics of the dataset

- Live data updated continuously – this includes claims being revised to correct for account metering errors
- Skewed distribution with significant outliers;

Validation

- Invoices sequentially numbered and satisfactory explanation given for invoices numbers (850) missing
- Totals of electricity consumption compares reasonably with audited accounts for 2005
- Sample testing against actual bills issued
- Sample testing of claims against separate table of payment history (claims table)
- Comparison of data provided with summary statistics provided by Enemalta

Creation of reference data set -2

Dataset

A subset of the invoice database was created containing the following information relevant for a simulation of billing using new tariffs:

- Account number;
- district code,
- number of persons,
- service locality,
- service premises code,
- invoice number,
- account number,
- period start date,
- period end date,
- invoice date,
- total due,
- meter reading status.
- A sum of all electricity and of water consumption, as well as claims related to consumption, was also calculated for each invoice.

A further database with the 'annual' consumption per account was created.

Possible issues

- It was decided to use the invoice start / end dates rather than the meter reading dates. This may not be completely accurate in the case of invoices where there is a meter change or where water and electricity are not read on the same day; however, any possible error is not believed to be significant, and the number of such occurrences is believed to be low. Consumption per invoice in cases of intervening water reading was also taken care of.
- Consumer scheme; ie whether the consumer is billed at domestic or commercial rates. It was not possible to reproduce this information as it was at the time the original bill was issued. A table with the schemes as on 2008 was provided, and this was used as the reference information. An (undated) history of all schemes assigned to each individual account between 1995 and 2008 was provided. There were 10584 movements between domestic and commercial in the 13 years – an average of around 814 per year and is not believed to be material.
- Claim variations – corrected manually except for Lm3.7million highlighted as possible corrections

2009 tariffs – residential

As per LN330 of 2008

- All charges per annum – if a bill issued for a shorter period, bands and service charges adjusted pro-rata
- Tariffs include VAT
- Service charge per account (independent of consumption)
 - Single phase: €65 per annum
 - Three phase: €195
- Usage charge per account
 - First 2000kWh: €0.161/kWh
 - Next 4000kWh: 0.173/kWh
 - Next 4000kWh: 0.189/kWh
 - Next 10000kWh: 0.209/kWh
 - Any consumption over 20,000kWh: €0.232/kWh
- Maximum demand (applicable to three phase >60A service)
 - €21.05 per kW peak in any period in one year

2009 electricity tariffs - residential

- Eco-reduction
 - Applicable only for actual meter readings or readings sent by consumer
 - Number of persons = 0
 - No eco-reduction
 - Number of persons = 1
 - Eco-reduction of 25% on consumption charge if consumption < 2000kWh
 - Number of persons > 1
 - Eco-reduction of 25% on consumption charge if consumption per person < 1000kWh
 - Eco-reduction of 25% on consumption charge up to 1000kWh times number of persons plus eco-reduction of 15% on remaining consumption charge if consumption per person < 1750kWh

2009 water tariffs - residential

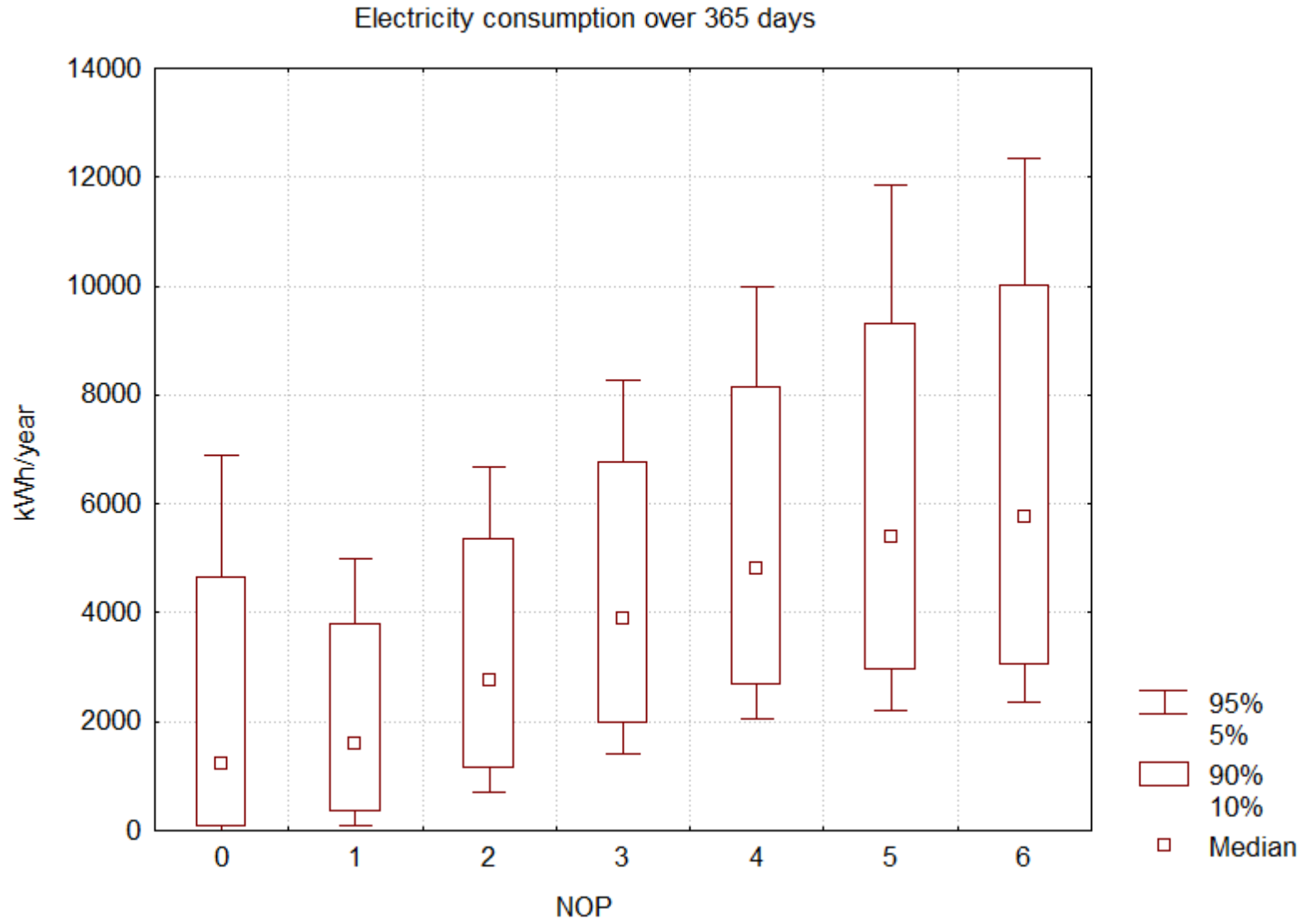
- All charges per annum – if a bill issued for a shorter period, bands and service charges adjusted pro-rata
- Service charge per account (independent of consumption)
 - €59 per annum
- Usage charge per account
 - One or more persons
 - First 33m³/person: €1.40 per 1m³
 - Remainder: €5.15 per 1m³
 - Zero person
 - First 33m³: €2 per 1m³
 - Remainder: €5.15 per 1m³

Simulations

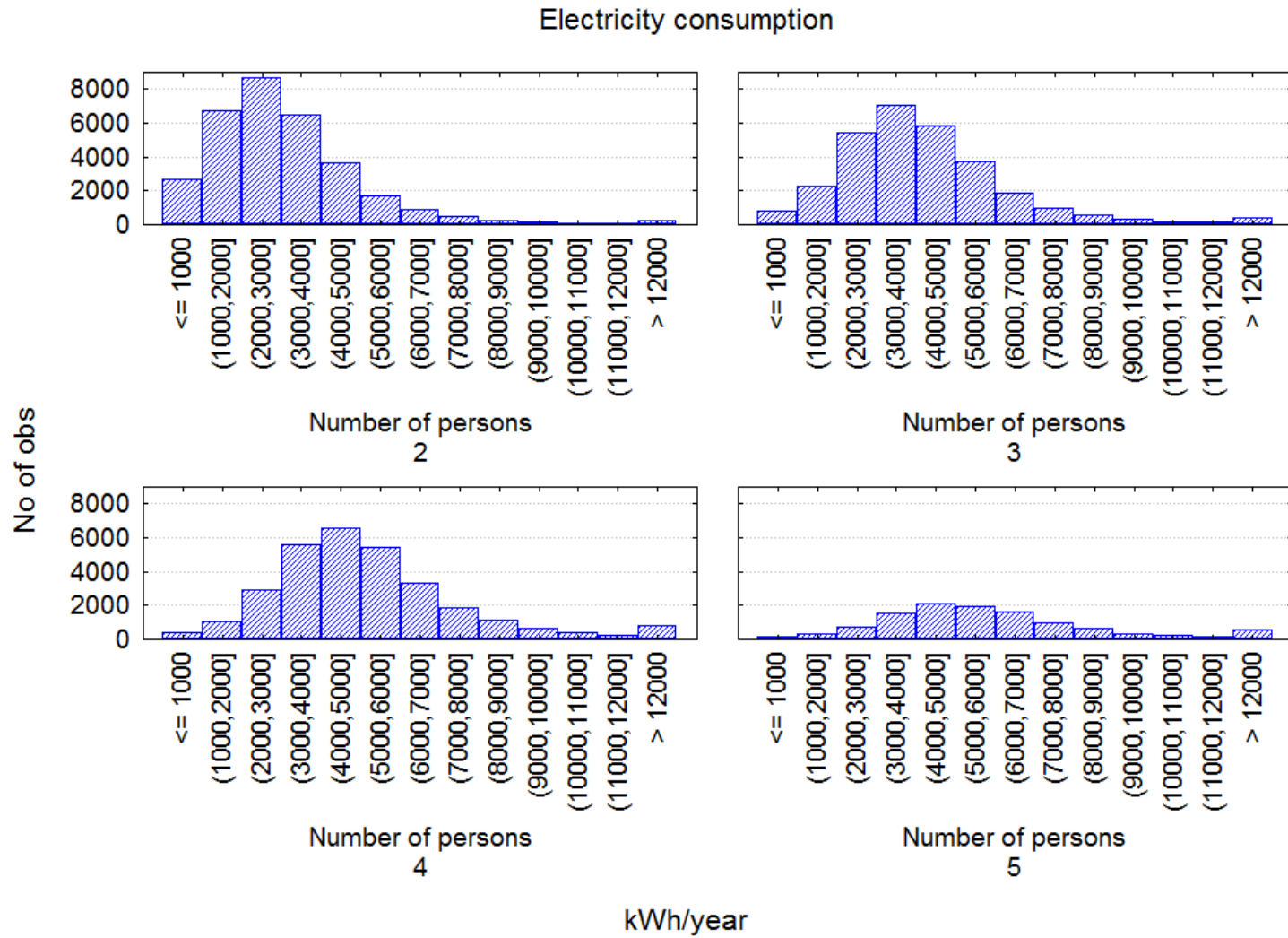
- Base year – The surcharge was not constant throughout the year 2006/2007. The actual claims were recalculated to assume a surcharge of 95%.
- A billing run was simulated on the data from the actual invoices using the new tariff schemes – is on 2 or more 6 month invoices per account
- The number of persons in the billing run was the same as that actually used for the issued bills, as shown on the bills posted to customers by WSC except for 0/1 persons, which were corrected appropriately.
- Billing runs using “365 day” consumption (as if one invoice for consumption for one year was issued) were also simulated. In such cases, the number of persons as per last invoice was used. This will be commented upon later.
- Limited information was available on which consumers had a three phase meter and were liable to the higher meter rates. All bills were calculated assuming a single phase meter. There are 8619 residential 3-phase meters and 11476 non-residential 3-phase meters. These were adjusted for revenue estimation purposes.
- Three other scenarios were modelled for revenue estimation purposes:
 - Electricity consumption decreases by 5% uniformly
 - Electricity consumption decreases by 10% uniformly; and
 - Electricity consumption decreases by a random factor between 0 and 10%.

DOMESTIC SECTOR

Domestic electricity consumption patterns

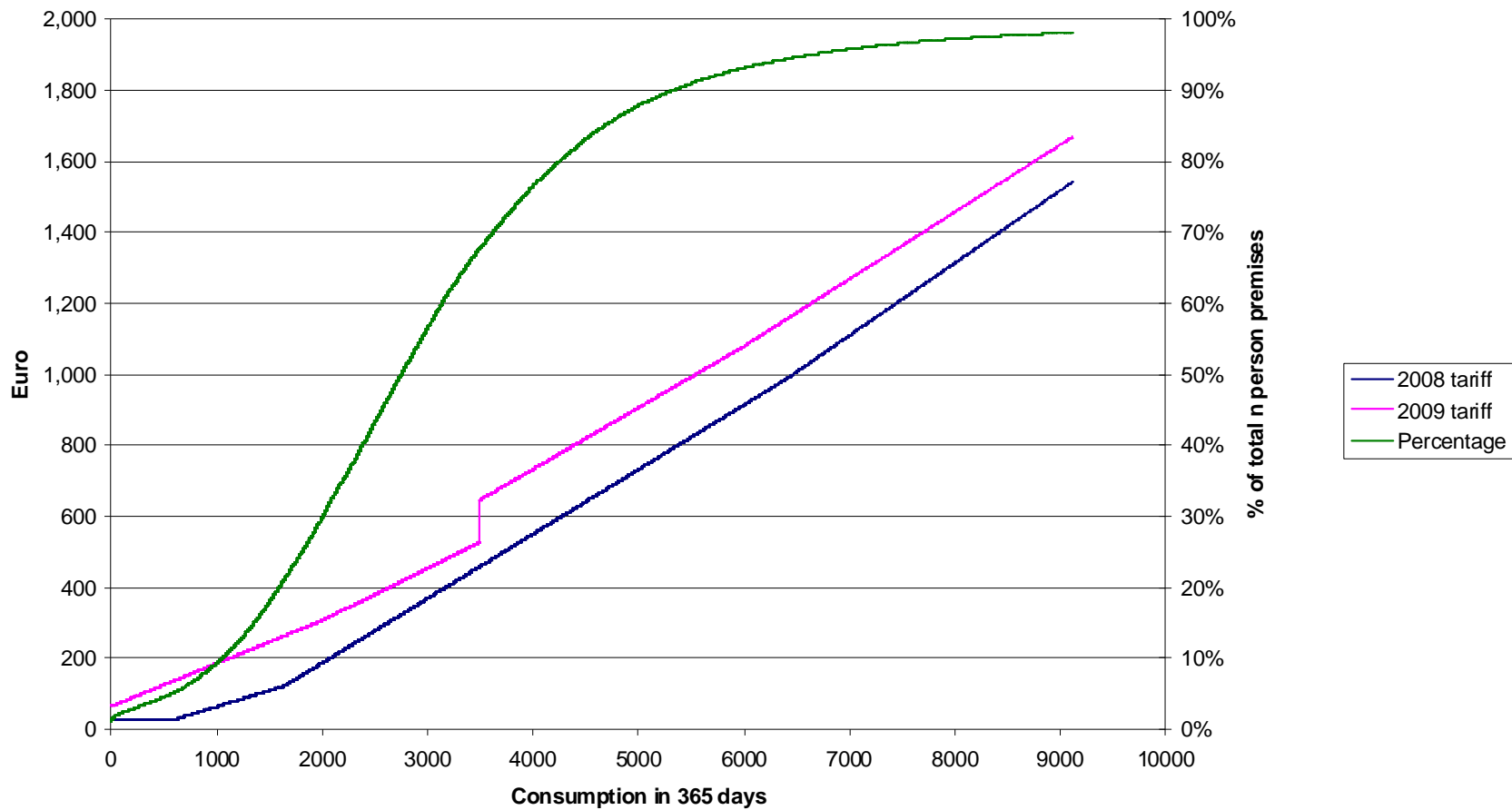


Domestic electricity consumption patterns



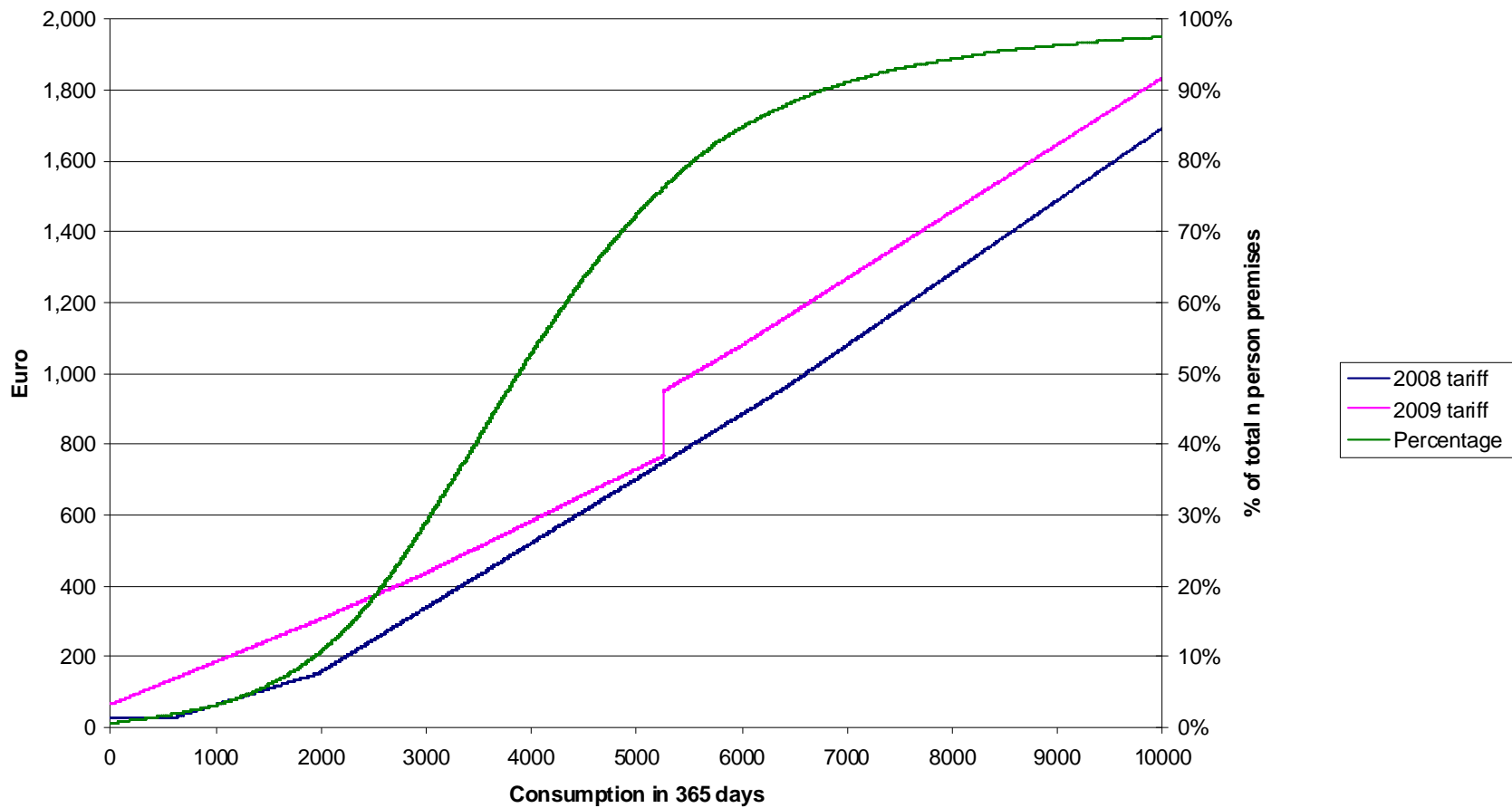
Cumulative consumption and bills, NoP=2

Residential Electrical Tariffs New vs Old NOP- 2



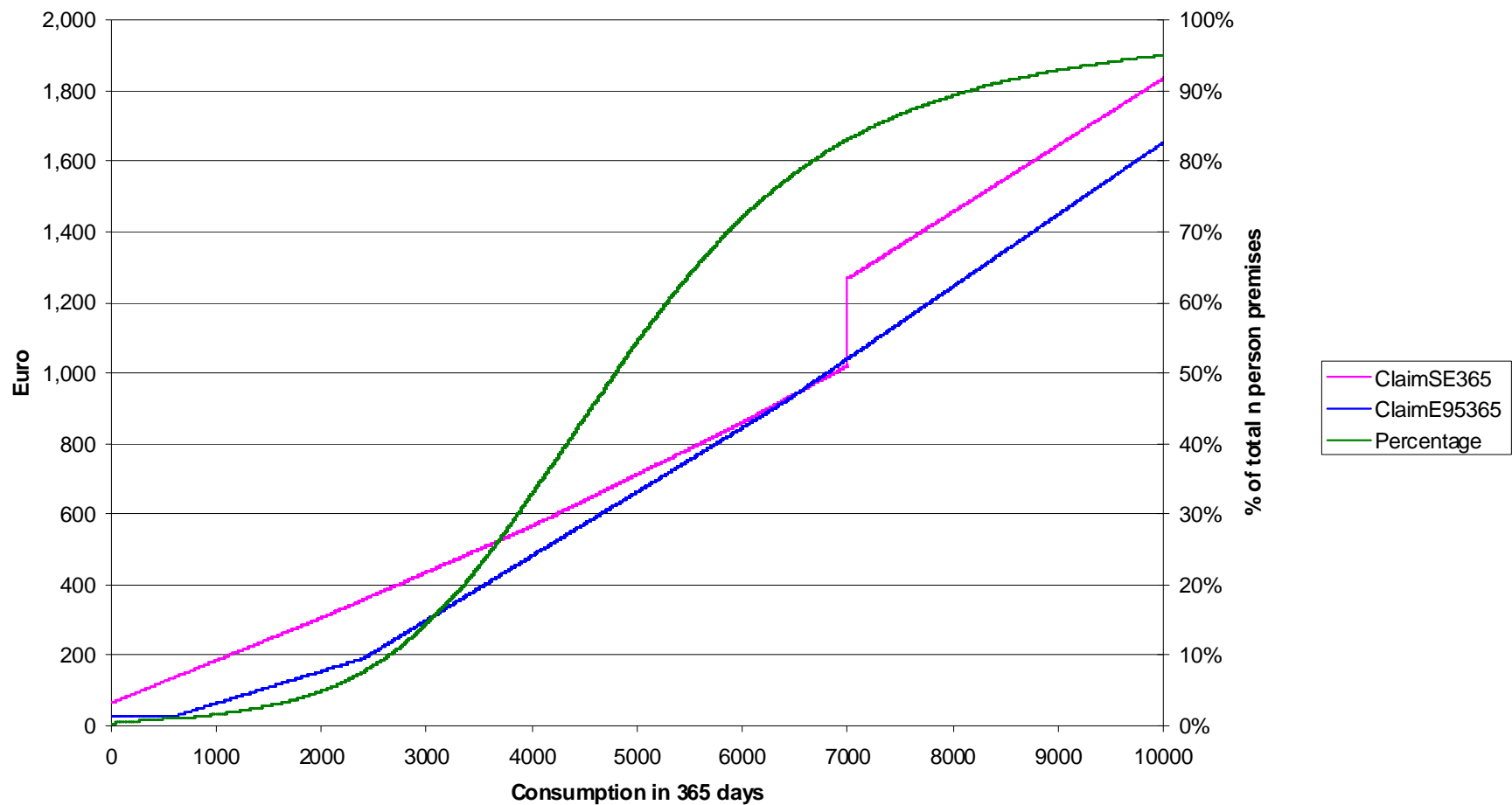
Cumulative consumption and bills, NoP=3

Residential Electrical Tariffs New vs Old NOP- 3



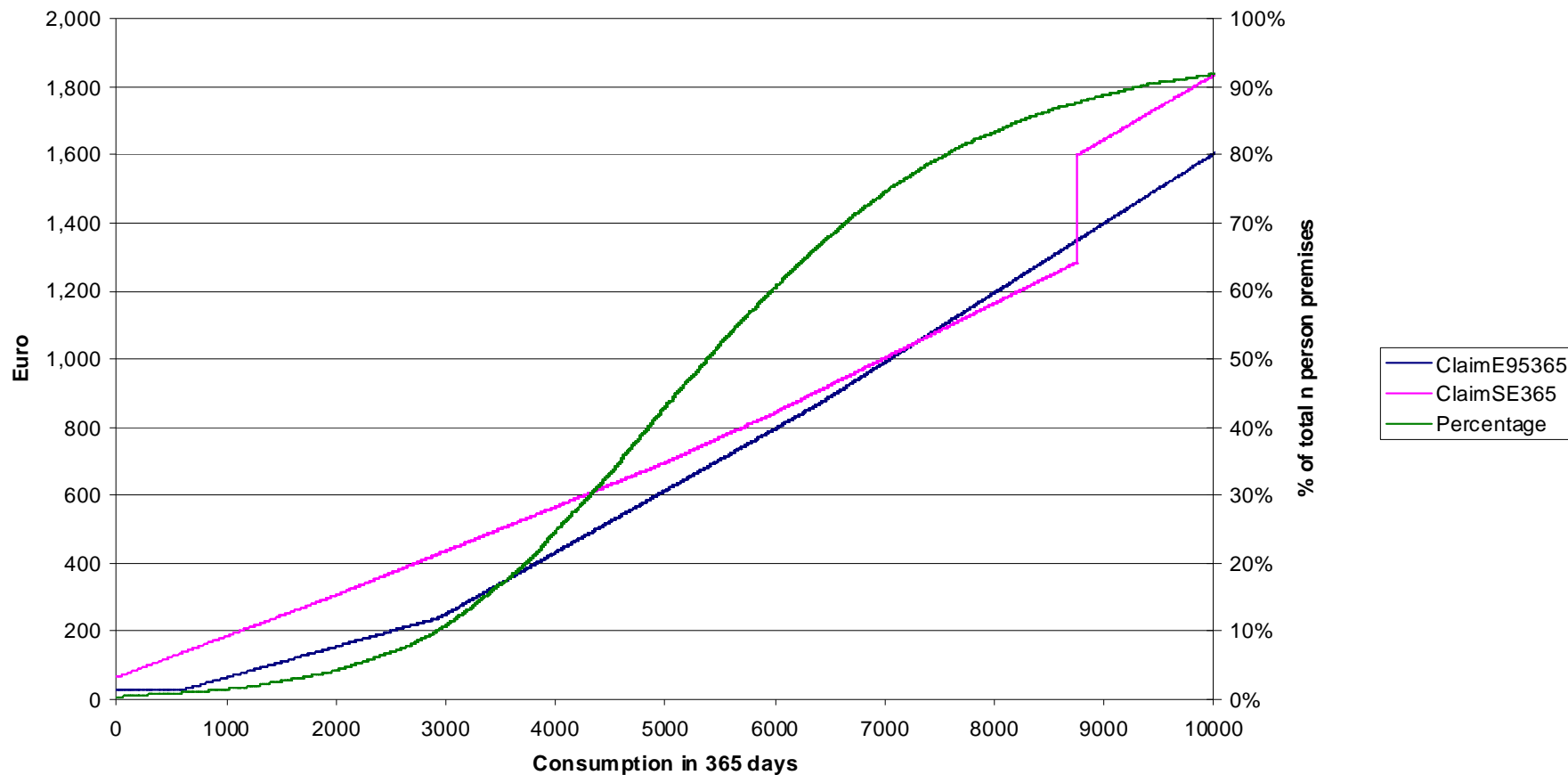
Cumulative consumption and bills, NoP=4

Residential Electricity Tariffs New vs Old NOP- 4

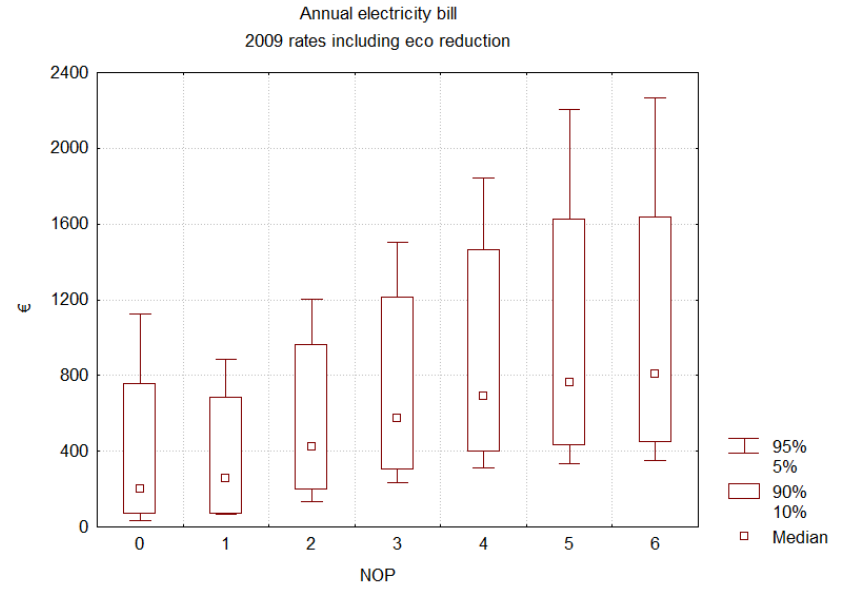
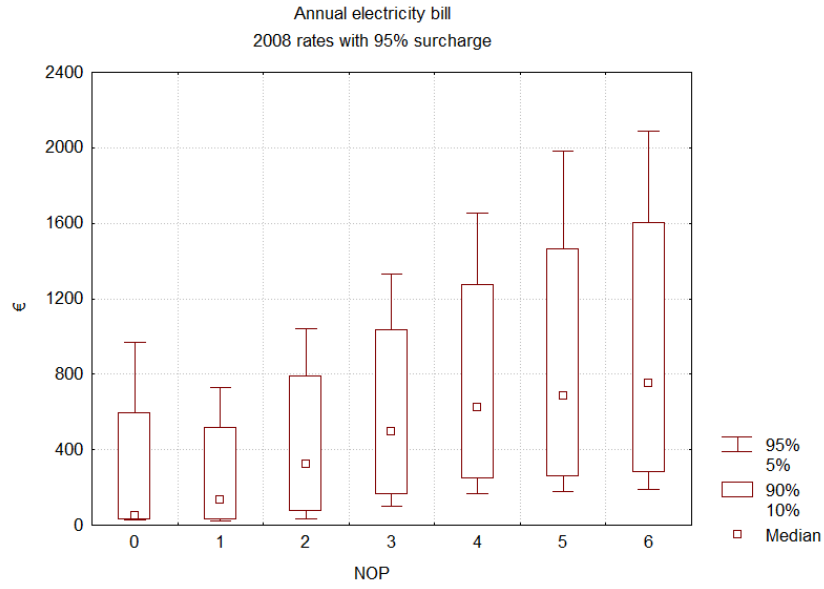


Cumulative consumption and bills, NoP=5

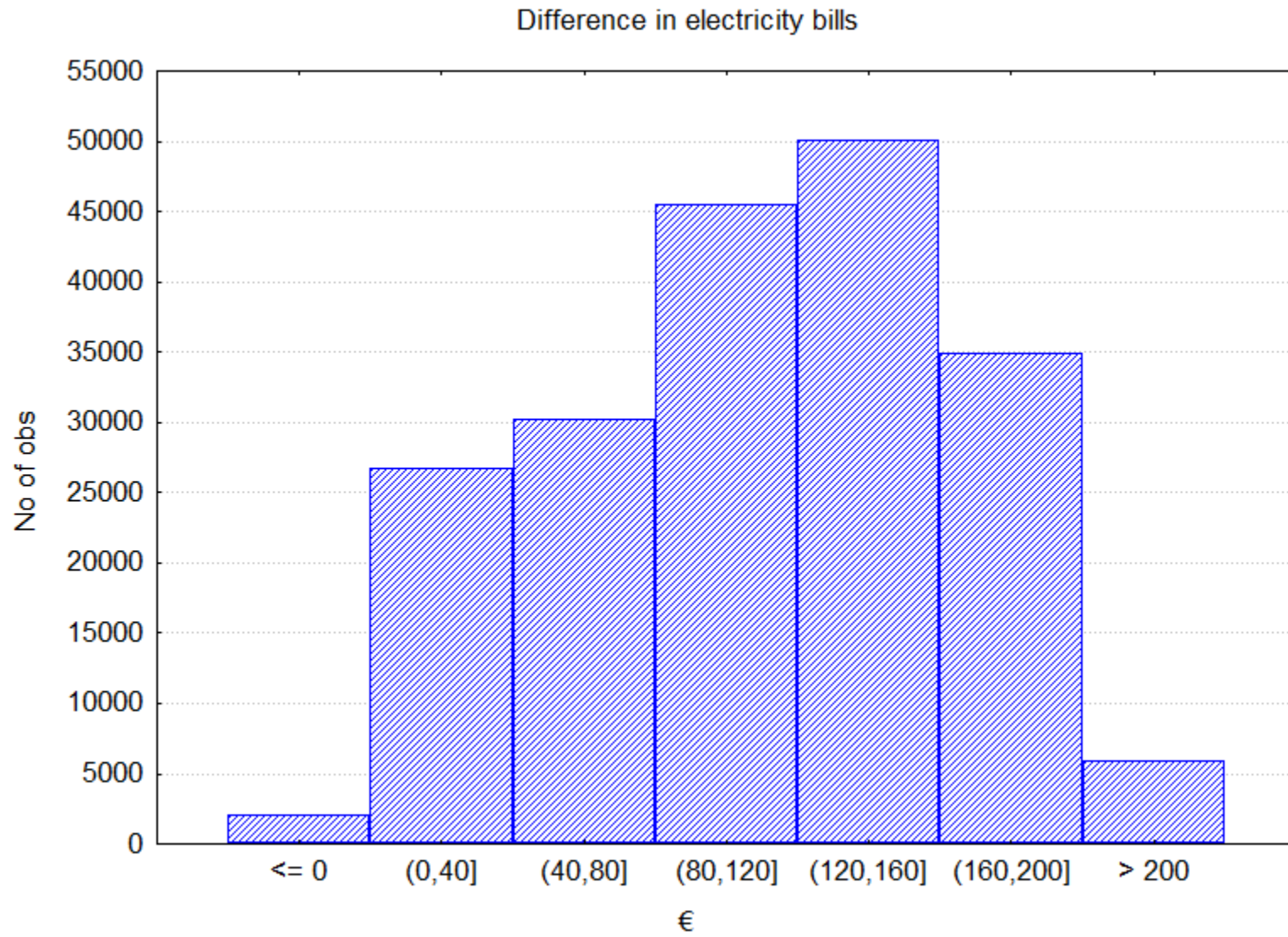
Residential Electrical Tariffs New vs Old NOP- 5



Electricity bills

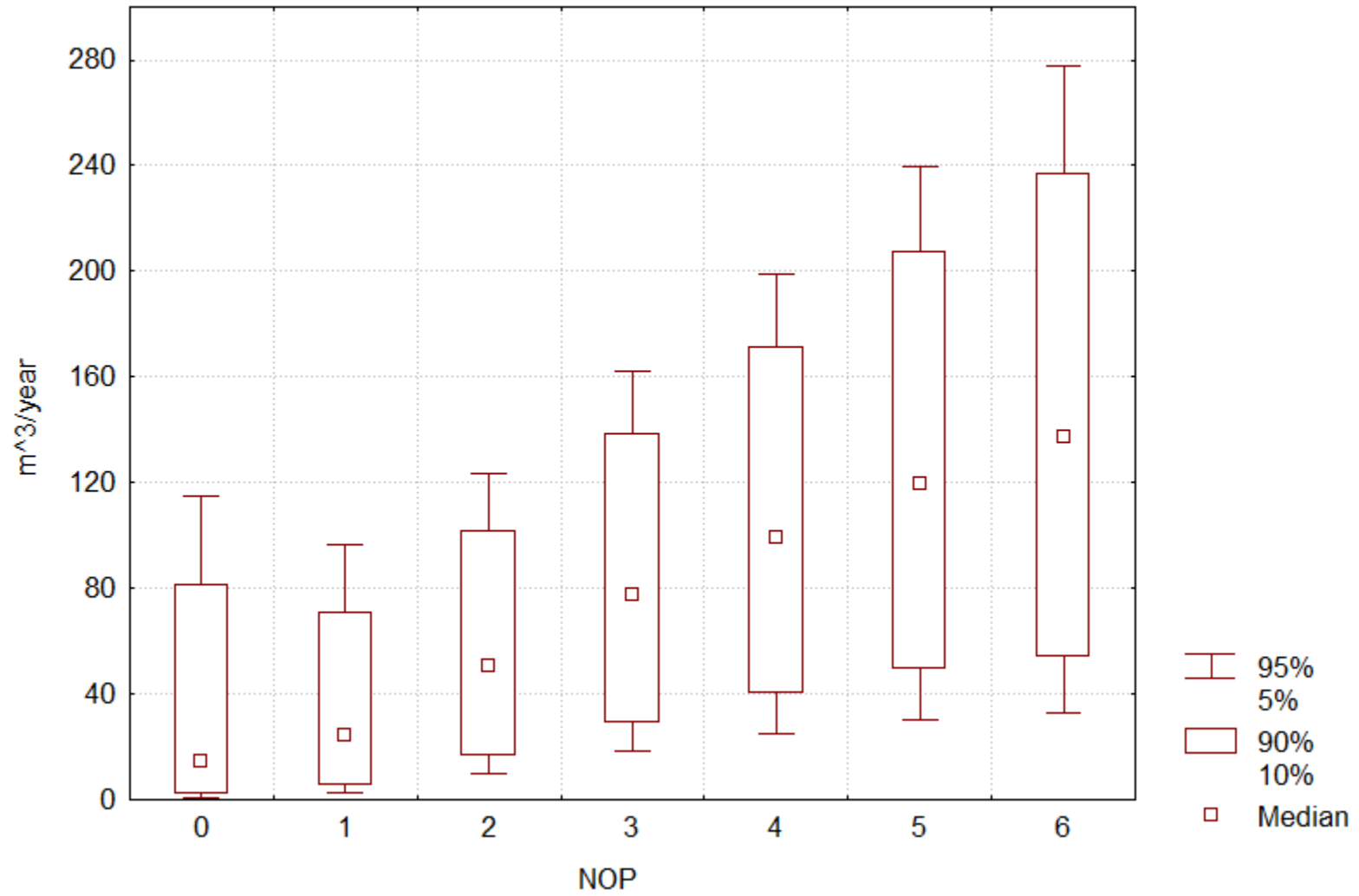


Difference in electricity bills

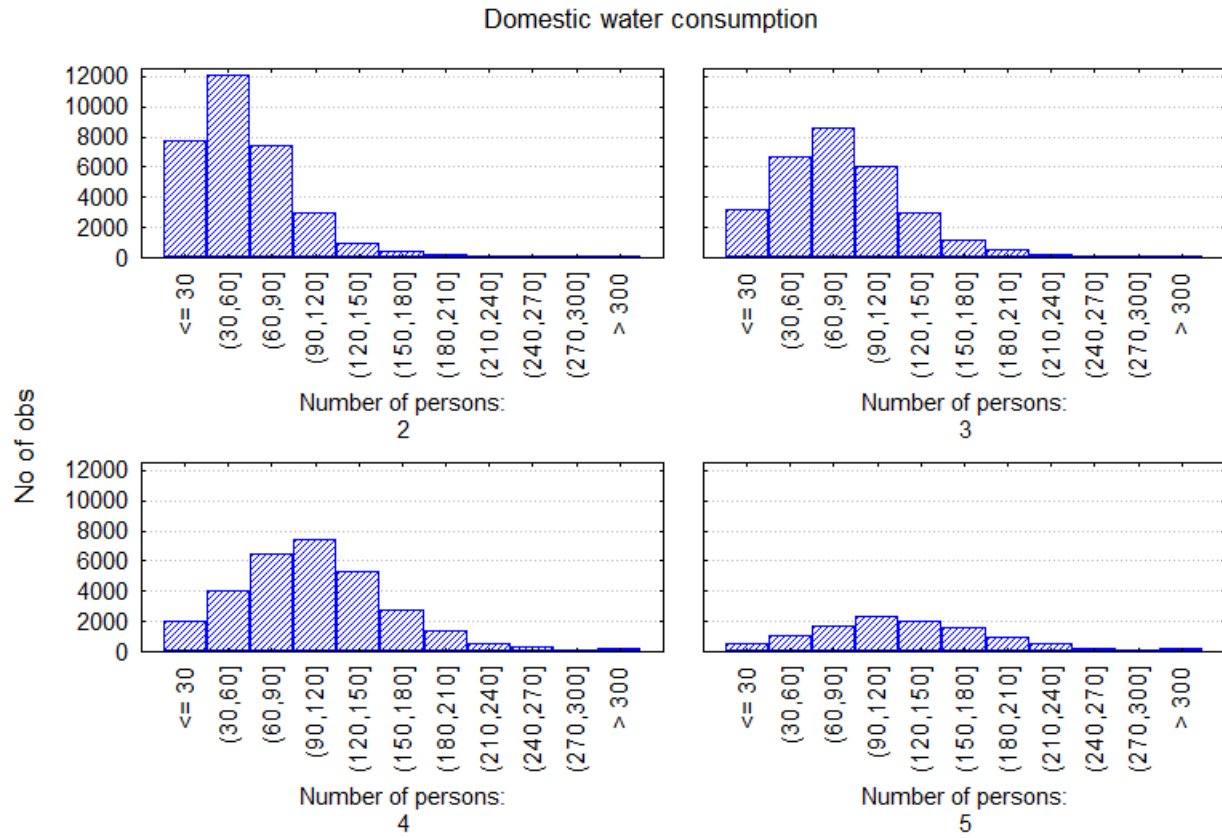


Domestic water consumption patterns

Water consumption in 365 days



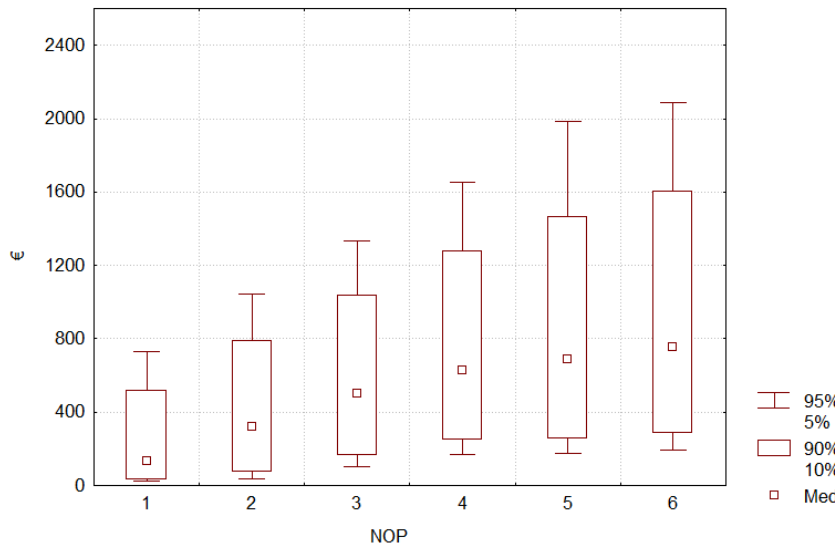
Domestic water consumption



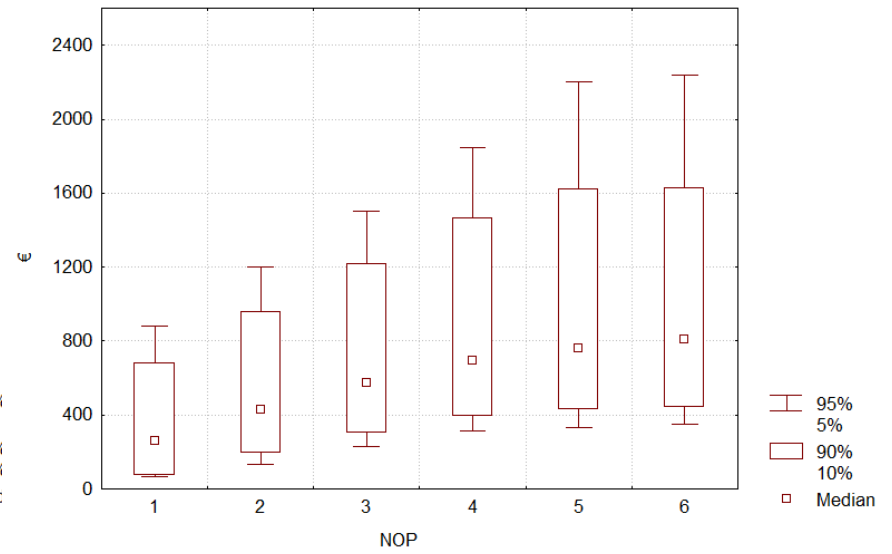
m³

Water bills

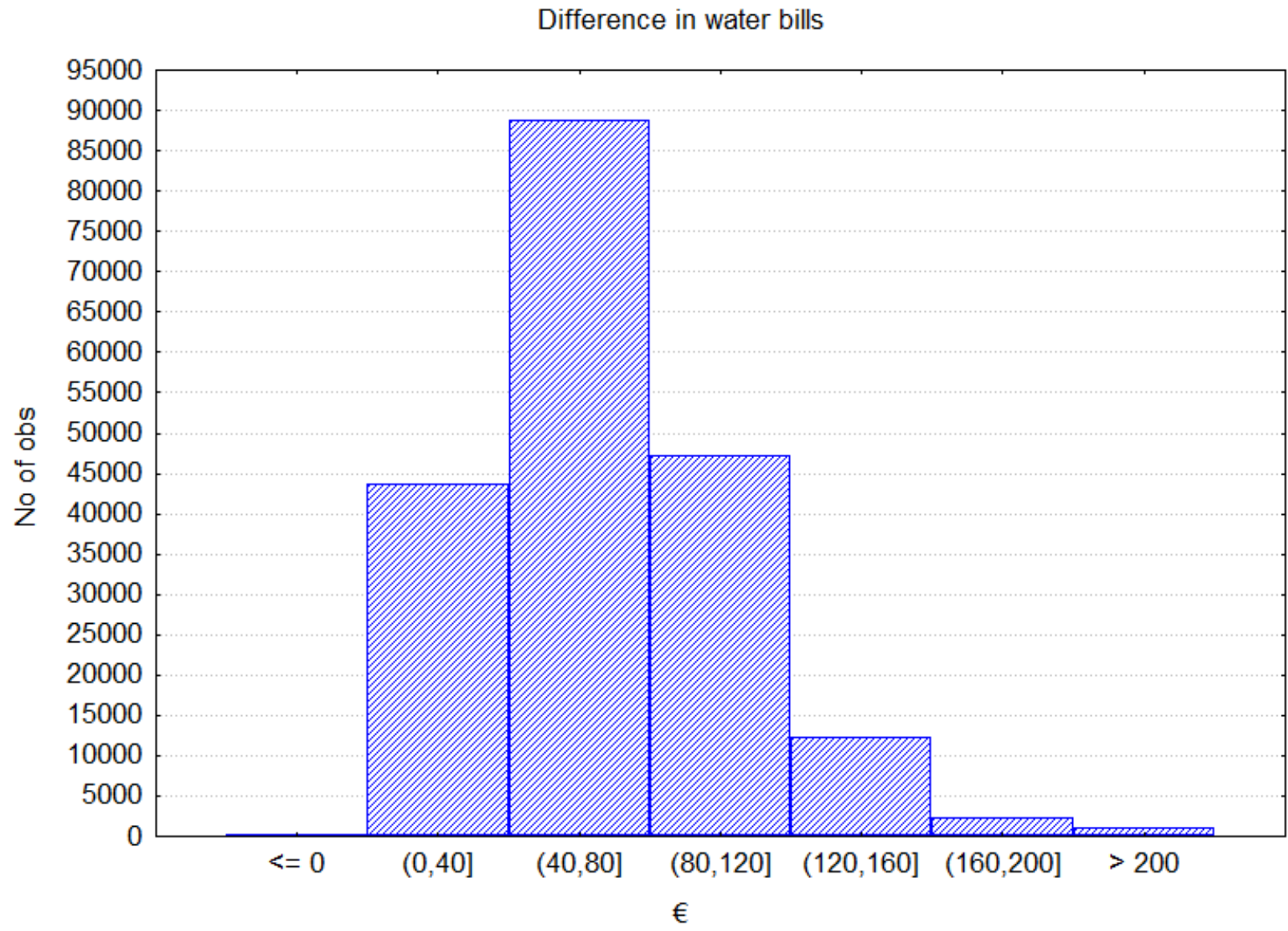
Annual water bill
2008 rates with 95% surcharge



Annual bill
2009 rates including eco-reduction

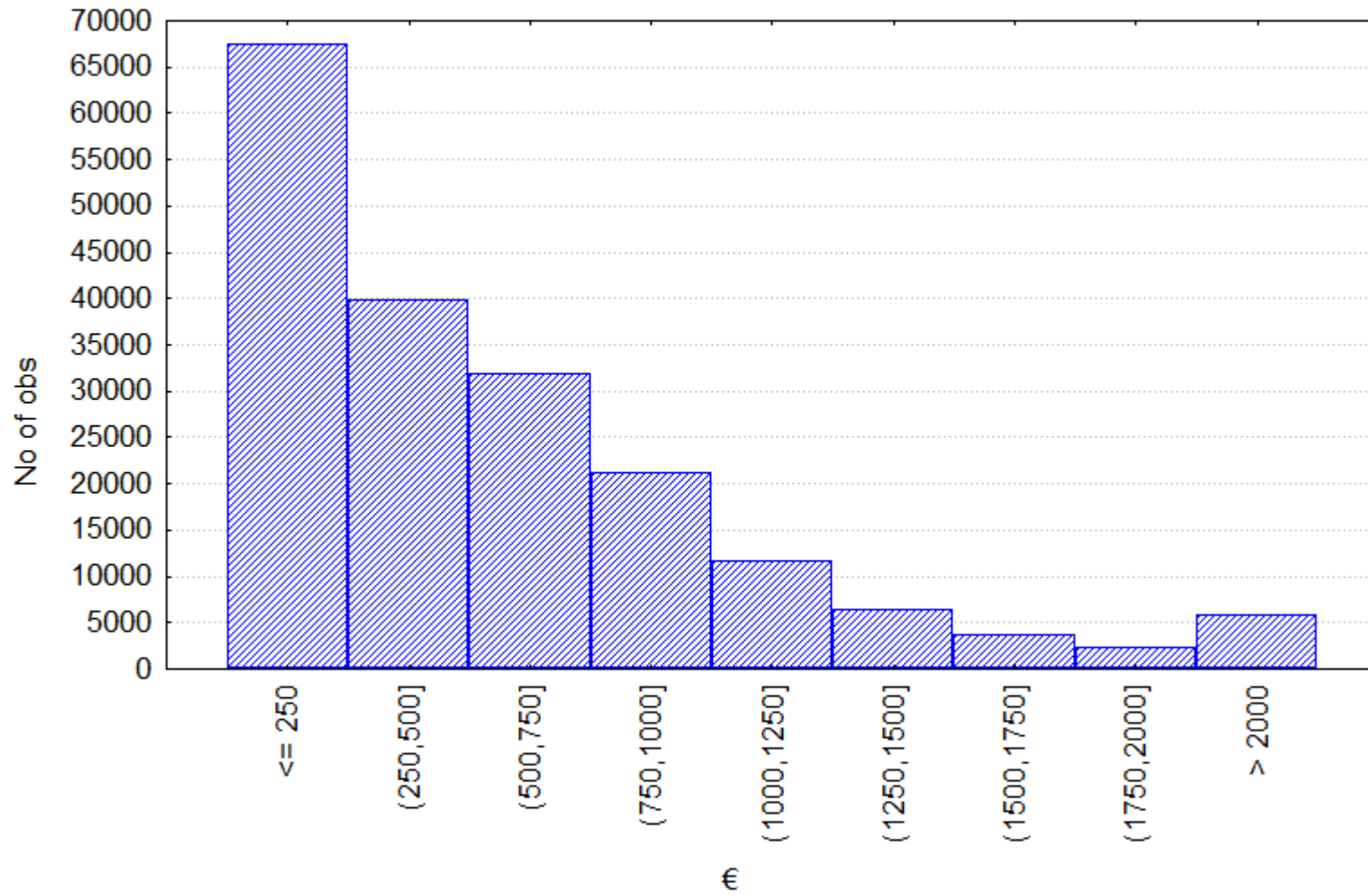


Difference in water bills

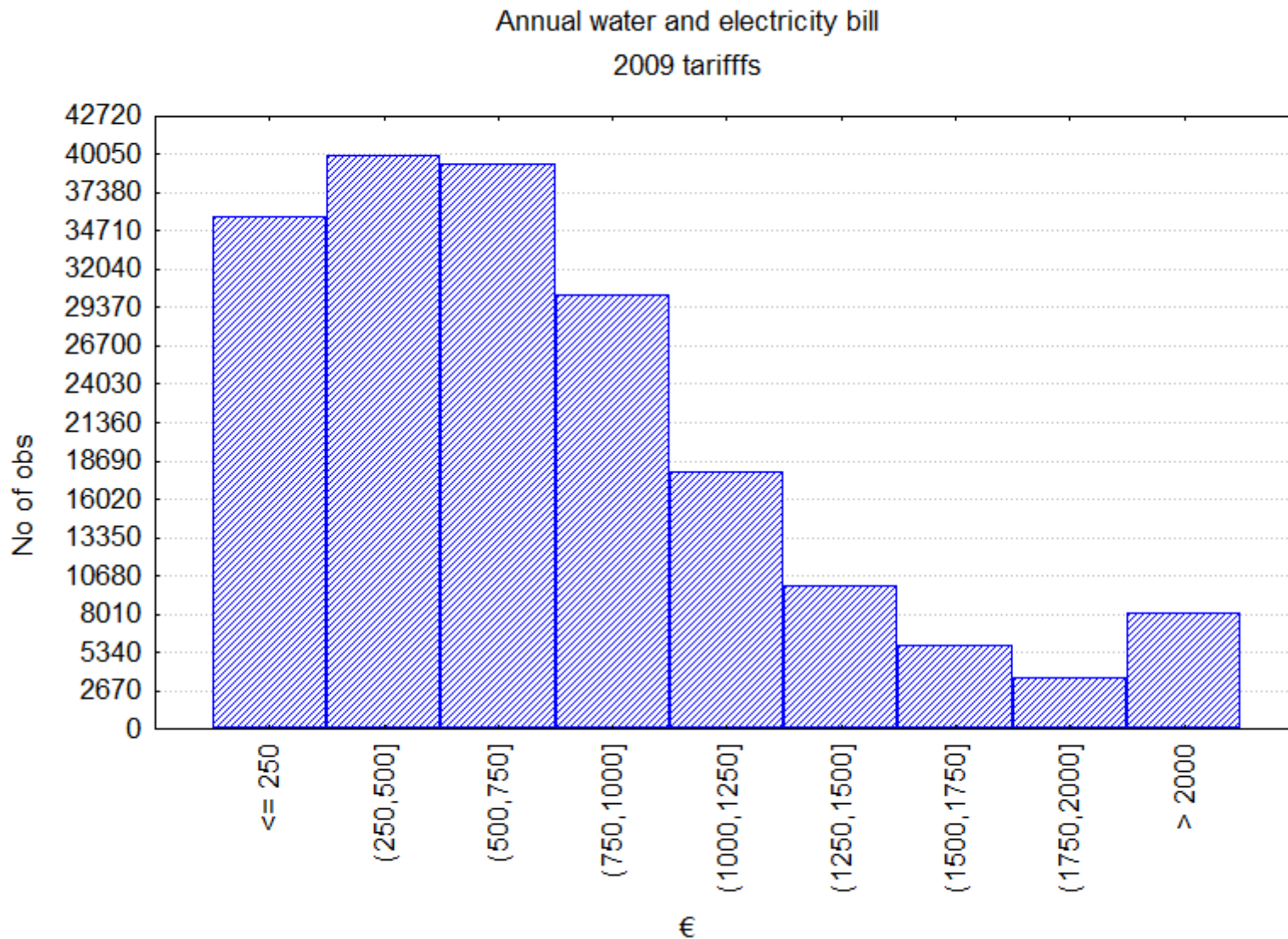


Water and electricity bills with 2008 tariffs

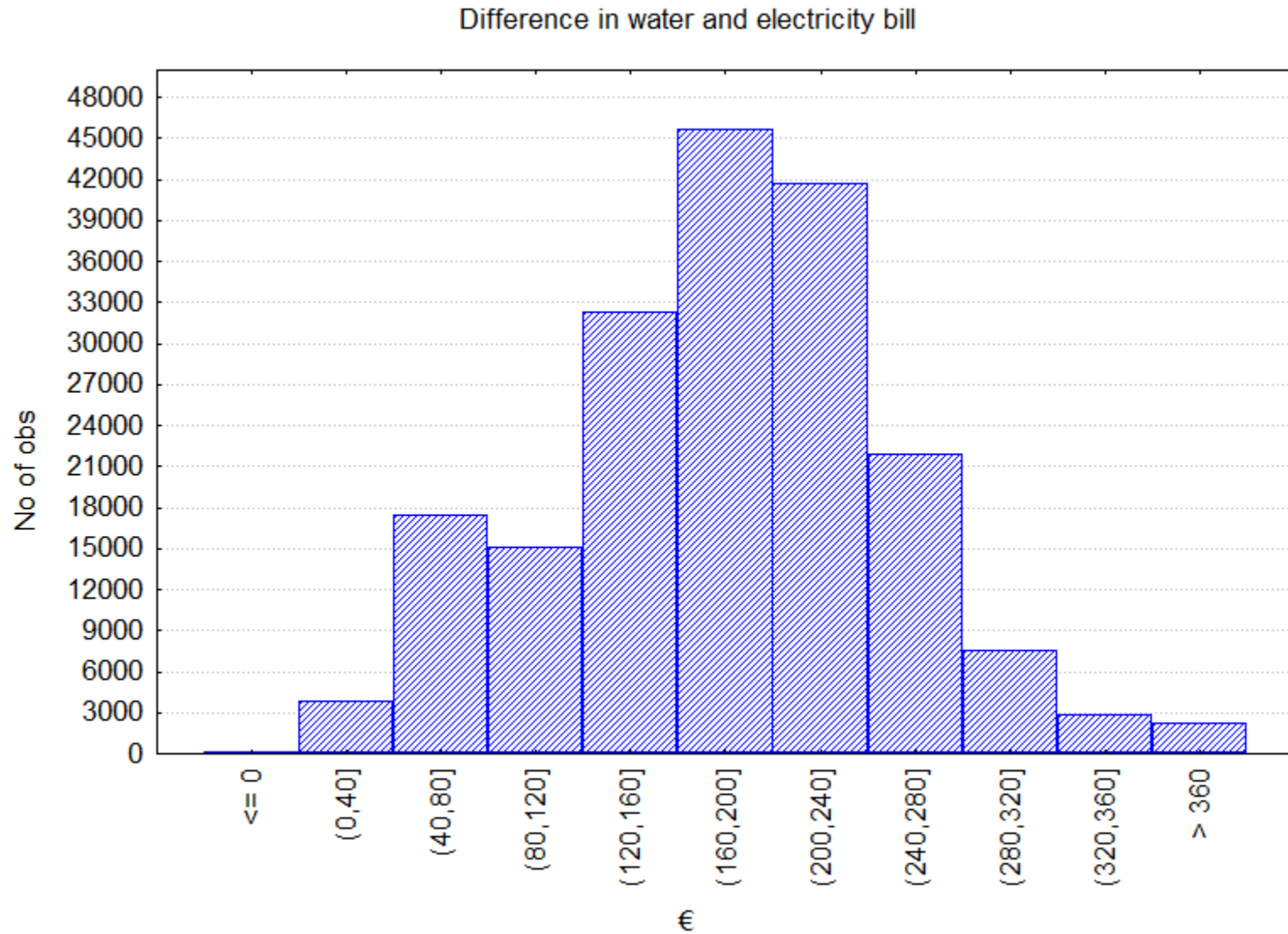
Annual water and electricity bill
2008 tariffs including 95% surcharge



Water and electricity bills with new tariffs - domestic



Difference in water and electricity bills – domestic sector



ECO-REDUCTION

Numbers of persons in database

- For the purpose of the dummy run, the number of persons recorded in each invoice was used. Invoice records show a number of persons = 1 in cases where the number of persons = 0, because the bill for water and electricity, up to 2008, was calculated as if there were one person living in that premises. WSC was requested to provide details of the actual number of persons living in each record, and one person households corrected to zero, as appropriate.
- Of the accounts in the reference database, the following is a summary of the number of the number of accounts with different family sizes.

No of persons	Count in reference database	Count from 2005 census
0	77,646	
1	21,339	26,259
2	32,695	35,643
3	29,780	30,581
4	30,632	30,729
5+	15,782	15,966

Eco-reduction

- Applies only to domestic consumers; certainly does not apply to garages, common areas in lifts and other empty premises
- Most appropriate to compare how it applies to the 130,288 premises billed at residential rates where the number of persons registered were 1 or above
- For these accounts, the number of invoices issued that cover, in whole or in part, the reference period, and which are eligible for an eco-reduction are shown below:

Number of invoices issued	Number of invoices with 15% eco-reduction	Number of invoices with 25% eco-reduction	Total
389,428	133,836	130,597	264,433
%	34%	34%	68%

- Of the 130288 accounts, 26,391(20%) never would have benefited from an eco-reduction, 72,018 (56%) always would have benefited from an eco-reduction, and the rest (31819 = 24%) would have sometimes benefited from an eco-reduction.

Always benefiting	Sometimes benefiting	Never benefiting
72,018	31,819	26,391
56%	24%	20%

- Working on a 365 day basis, the eco-reduction as per LN amounted to a reduction of €12.3million in total. When taking into account the billing patterns (ie the fact that bills are read every six months) the amount of eco-reduction is reduced by €0.5million.

Breakdown by accounts

(113,301 accounts received 3 invoices, others had 1, 2, 4 or more invoices)

25% eco reduction	15% eco-reduction	No eco-reduction	Number of accounts
3	0	0	25,262
2	1	0	7,507
1	2	0	8,348
0	3	0	22,523
2	0	1	4,453
1	1	1	2,466
0	2	1	8,680
1	0	2	4,011
0	1	2	7,826
0	0	3	22,225

Breakdown by accounts (continued)

4 invoices		
Count of invoice	Eco 15	Eco25
1531		
336		1
275		2
319		3
1252		4
432	1	
124	1	1
104	1	2
327	1	3
395	2	
153	2	1
374	2	2
404	3	
413	3	1
859	4	

2 invoices		
Count of invoice	Eco 15	Eco25
1931		
716		1
2011		2
836	1	
829	1	1
1708	2	

1 invoice		
Count of invoice	Eco 15	Eco25
526		
421		1
125	1	

Total revenue estimates

	Total electricity
Revenue, domestic invoices	€115m
Revenue, domestic -5%	€108m
Revenue, domestic -10%	€102m
Revenue, domestic -rnd	€108m

	Total water
Revenue, domestic invoices	€37.3m

VAT included

Installation charges excluded

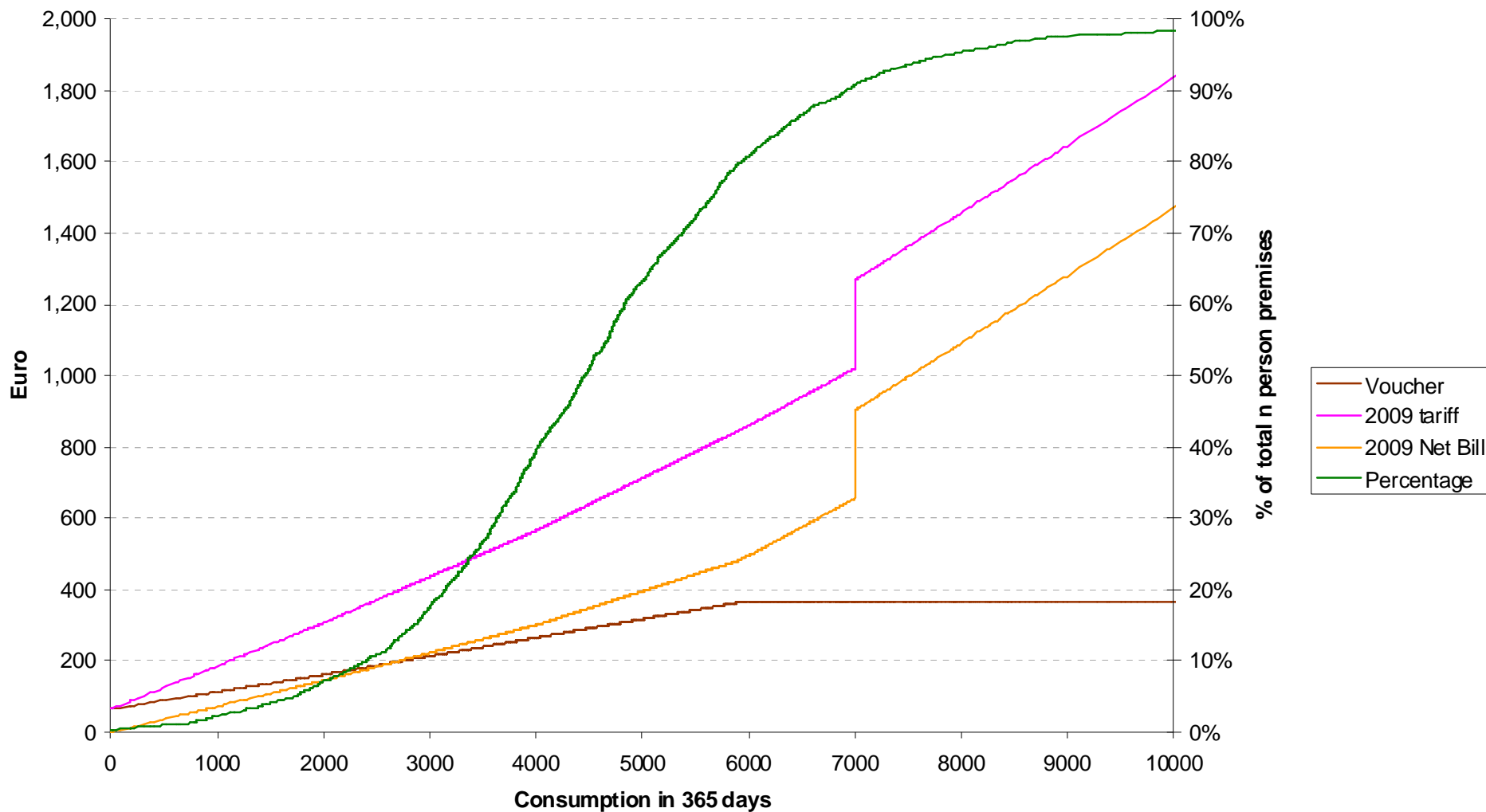
SOCIAL ASSISTANCE

Social assistance

- Limited detailed information available.
- WSC records indicate consumers who were eligible to preferential tariffs prior to the introduction of the voucher system.

Example of impact of social assistance voucher

Social Assistance Voucher
NOP- 4



Thank you for your attention