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Analysis of the allocation of network and other related costs between grid customer groups and across jurisdictions

Main report

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Abbreviations and acronyms

CC	Competition Commission
CCL	Climate change levy
CAIR	Collection Agency Income Requirement
DNOs	Distribution network operators
DSMC	Demand-side management charge
DUoS	Distribution use of system
EHV	Extra high voltage (level of the distribution network)
GB	Great Britain
HH	Half-hourly (metered)
HV	High voltage (level of the distribution network)
I&C	Industrial and commercial
kV	Kilovolt
kVA	Kilovolt ampere
kVArh	Kilovolt ampere reactive
kWh	Kilowatt hour(s)
LV	Low voltage (level of the distribution network)
MIC	Maximum import capacity
MV	Medium voltage (level of the distribution network)
MWh	Megawatt hour(s)
NI	Northern Ireland
NIE	Northern Ireland Electricity (Transmission and Distribution)
NISEP	Northern Ireland Sustainable Energy Programme
Opex	Operating and maintenance expenditure
PSOs	Public service obligation(s)
RAB	Regulatory asset base
REFIT	Renewable energy feed-in tariff
ROCs	Renewable obligation certificates
RoI	Republic of Ireland
SEM	Single energy market
SONI	System Operator for Northern Ireland
SSS	System support services
SWales	South Wales (distribution network area in GB)

SWest	South West (distribution network area in GB)
TUoS	Transmission use of system
UoS	Use of system
UR	Utility Regulator (Northern Ireland Authority for Utility Regulation)
WACC	Weighted average cost of capital
WPD	Western Power Distribution

Extended executive summary¹

1.1 Objective is to understand why some tariffs are high

Recent analysis of final end-user electricity prices in Northern Ireland (NI) by the Utility Regulator (UR) revealed that:

- o Electricity prices for larger non-residential consumers in NI are among the highest in Europe
- o Prices for smaller non-domestic and residential consumers are less divergent.

In this respect, network and other pass-through costs could be a significant factor in explaining some of these differences, as network charges constitute more than a quarter of final electricity prices. However, in responses to a previous UR consultation², market participants noted that:

- o On the whole, higher absolute network use of system (UoS) charges are not a significant factor in the final electricity price differentials between NI and other jurisdictions, although **other charges** levied or collected by network operators could be contributing factors
- o **Large industrial and commercial (I&C)** customers may be disproportionately shouldering network costs compared with other jurisdictions, thereby resulting in relatively higher network charges (and therefore final electricity prices) for **this particular customer segment** compared to smaller customers.

In order to systematically address these issues, UR engaged Economic Consulting Associates to provide comparisons of the overall level of transmission and distribution network and related charges in each of NI, the Republic of Ireland (RoI) and relevant comparators in Great Britain (GB) and to:

- o Analyse the differences in and the key costs leading to network-related allowed revenues
- o Examine and analyse the allocation of network costs across customer categories in the respective jurisdictions.

The jurisdictions and/or distribution network areas with which NI charges are compared in GB are the **South West** and **South Wales** areas operated by Western Power Distribution (WPD).

¹ This has been prepared as an abridged version of the main report, which may be used on a stand-alone basis for the purposes of consultation within NI government and/or more broadly instead of (or in addition to) the main report.

² See NI Electricity Price Transparency: follow-up paper (4 November 2013), UR, which summarises responses from interested parties, http://www.uregni.gov.uk/publications/follow-up_paper_on_northern_irelands_electricity_price_transparency

In general, the study's findings concur with the premises above, namely that overall core network tariff levels do not contribute to higher end-user electricity prices in NI compared with the other jurisdictions; rather, observed variances are due to **the level and allocation of non-network pass-through charges**, as well as **the allocation of network costs across customer categories**.

1.2 Study approach

1.2.1 Focus on network-related charges

Electricity tariffs to end-users broadly include:

- o Wholesale (generation and/or import) costs
- o Transmission and distribution network costs
- o Supply or retail costs and margin
- o Miscellaneous other charges and levies.

The build-up of average charges to customers in NI in 2012/13 and 2013/14 has been previously calculated by UR as shown in Figure 1 below.³

Figure 1 Build-up of NI's average end-user electricity prices											
	Wholesale costs	+	SSS charges and CAIRT	+	PSO levy	+	Use of system	+	Supplier charge	+	NIRO costs
	Generation costs (costs of procuring electricity) and MO charges		For system operation and the Moyle interconnector		PSO costs which must be spread across all customers		Cost of transmission and distribution of electricity		Costs to supply electricity to customers		Net costs of NI Renewable Energy Obligation
2013/14	58%		4%		2%		22%		9%		2%
2012/13	62%		3%		2%		25%		9%		1%

Source: adapted from Power NI's July 2013 Tariff Review, a Regulatory Briefing, May 2013, http://www.uregni.gov.uk/uploads/publications/Retail_Tariff_Background_Briefing_May_2013.pdf.

The charges that are the focus of this study are those that are neither wholesale nor retail. These are:

- o The (transmission and distribution) **network tariffs** which represent between 22 and 25 per cent of the total charges (shown within the bold rectangular box in the figure and labelled "use of systems")

³ The totals do not add up to 100 per cent, as we have excluded the adjustments from 'correction factors' for reasons of simplicity and legibility.

- o **Levies or obligations** that may be associated with or linked with the transmission and distribution licensees (or retail suppliers). These are the charges within the dotted boxes and represent 6 to 8 per cent of average end-user charges. We refer to these levies and obligations as ‘other’ costs or charges.⁴

1.2.2 Comparisons are imperfect

When assessing revenues and tariffs across the jurisdictions and distribution areas, it is important to note that such comparisons are not strictly like-for-like and are necessarily imperfect (even ignoring the underlying differences in network cost drivers). Key differences arise from:

- o the nature of the costs that are recovered from UoS tariffs
- o the specific levies and charges applying in the respective jurisdictions.

For example, in both NI and RoI, **connection costs** have been partially cross-subsidised in the past from network charges, such that customers only paid a portion of the costs of connecting them to the network (this policy continues to apply in RoI). The connection costs not borne by customers were/are included in the regulatory asset base (RAB) of the network providers and therefore their allowed UoS revenues. This means that overall, because of differences in policies on connection charges, UoS tariffs in NI, RoI and GB will, all else being equal, be different: RoI would be the highest, NI next, and GB lowest.

Comparison between GB and NI/RoI will also be distorted because NIE is responsible for **meter assets and meter reading** while in GB metering is handled by independent companies. However, comparisons between NI and RoI will not be distorted (for this reason) because, like NIE, ESB Networks is also responsible for metering.

1.2.3 Specific levies and charges that are included in the analysis

In NI, there are three charges that are included with network tariffs. These are:

- o the System Support Services (SSS) levy
- o the Collection Agency Income Requirement (CAIR) charge⁵
- o a Public Service Obligation (PSO) levy.

In addition to these charges, this study examines:

- o renewable obligation certificates (ROCs), and
- o the Climate Change Levy (CCL).

⁴ Some of these ‘other charges’ have since been renamed or replaced by alternative schemes (such as the Renewable Obligation Certificates, instead of the NIRO), while the ‘Climate Change Levy’ is missing from the graph. The charges examined in the present study are described later in this Section.

⁵ Support for the Moyle interconnector.

Although these last items are levied or imposed at the retail level, they represent additional costs passed through to third parties and which may help explain differences between NI electricity charges and those in other jurisdictions. Also, costs associated with renewable generation are included in the PSO in RoI, so inclusion of ROCs is necessary for ensuring a like-for-like comparison. The cost comparisons include the Demand Side Management Charge (DSMC) in RoI, as this is an additional network related charge paid by all customers in that jurisdiction. Finally, support of the East-West Interconnector (EWIC) is provided for in the RoI transmission allowed revenues and the associated TUoS charges; this has no equivalent in the other two jurisdictions.

All the 'other' charges and their equivalents in RoI and GB that are included in the analysis are summarised in Table 1.

Table 1 Summary of other costs included in cross-jurisdictional comparisons

NI (or RoI) levy or obligation	Presence of same or equivalent charge in jurisdictional comparison		
	NI	RoI	GB
SSS levy	✓	✓	✗ ⁶
CAIR charge	✓	✗	✗
PSO charge	✓	✓	✗
ROCs	✓	✓ (PSO)	✓
CCL	✓	✓ (Electricity tax)	✓
DSMC	✗	✓	✗
EWIC	✗	✓	✗

1.3 NI's average network costs are not the explanation

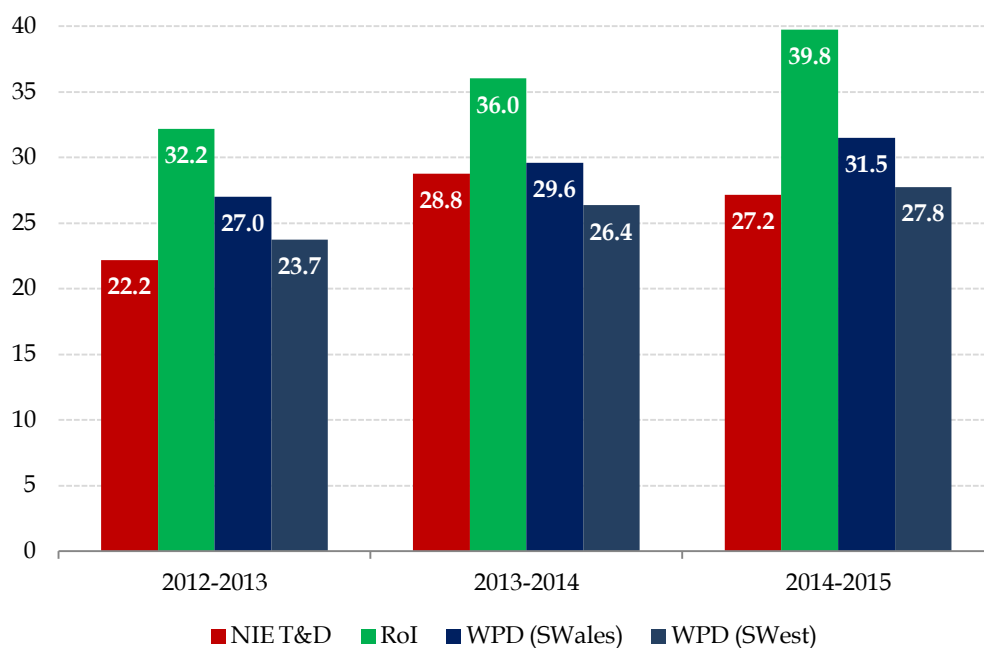
We begin by asking how have overall **average network charges** per kWh differed by jurisdiction over the past three years? We also consider the contribution of the 'other' charges to the average.

⁶ The SSS-equivalent costs in GB are included in National Grid charges. The GB comparisons only cover the distribution companies and not National Grid. The GB distribution companies' network assets are comparable with the transmission and distribution networks in NI and RoI.

1.3.1 Average network charges in NI, RoI and GB

The average network charges in the three jurisdictions (covering both transmission and distribution), excluding 'other' charges are summarised in Figure 2 below⁷. They relate purely to the network-related costs and revenues.

Figure 2 Network charges excluding other costs (£/MWh, 2014 price levels)



The above chart shows that:

- o Average pure network charges in RoI, excluding levies and other costs, are consistently higher than both NI and GB
- o NI's average pure network charges are lower than, or similar to, those in GB.

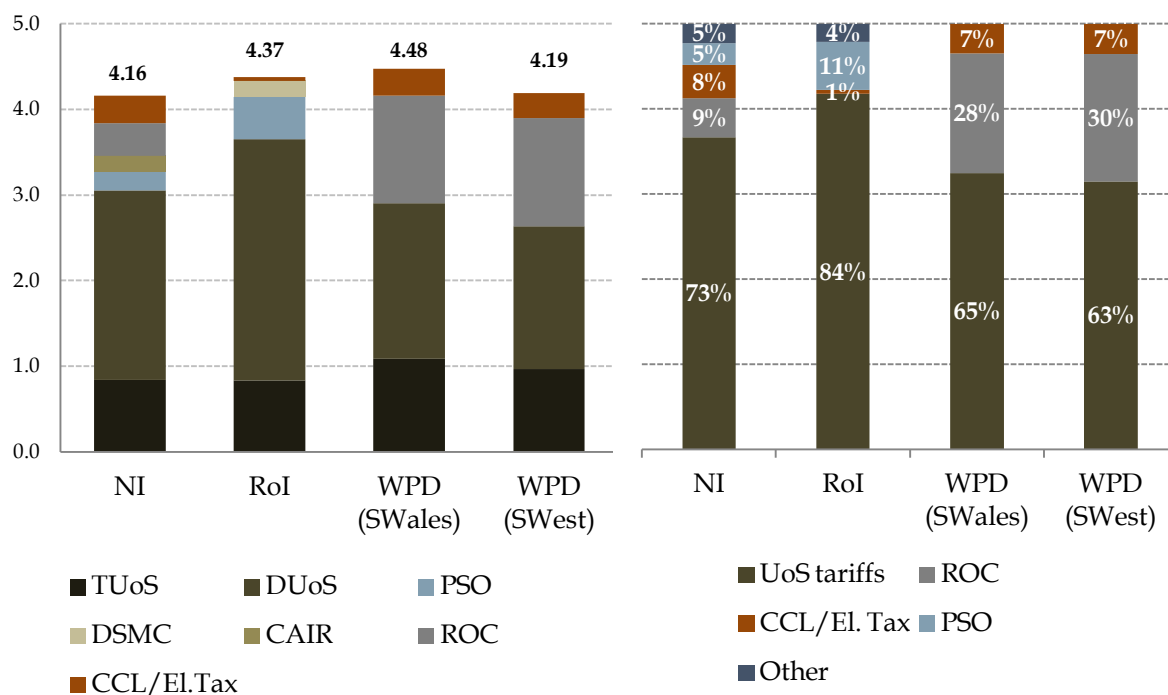
Over the entire three-year period, NI's average network charges are approximately the same as WPD (South West), about 11 per cent below WPD (South Wales), and more than 30 per cent lower than RoI. Hence, consistent with the responses received during UR's earlier consultation, these results confirm that **network charges are not higher in NI than in the other jurisdictions** when compared on an average basis across all customers and without the addition of other charges.

⁷ These have been calculated using the revenues set at the start of the most recent multi-year control period in the respective jurisdictions/ distribution network areas. In NI and GB, the allowed revenues are set on an April-March year, while in RoI they are set on a calendar year basis. Hence, for RoI, the corresponding years shown in Figure 3 are the 2012, 2013 and 2014 revenue (or calendar) years.

1.3.2 Average network tariffs plus other charges

In Figure 3 below we show network charges plus all the 'other' charges described above (in both absolute and proportionate terms)⁸.

Figure 3 Network charges & other levies/costs in 2012/13 (p/kWh, 2014 prices)



The graph above (left-hand panel) shows that the inclusion of the other charges brings average network charges across the jurisdictions closer together. The right-hand panel shows that this is because other charges represent a much more significant proportion of total charges in GB (about a third) than in RoI (about one sixth); NI is intermediate between the two (the other charges are about a quarter of the total).

With the addition of other charges, therefore, **overall average tariffs and charges in NI are at least comparable with and generally lower than the comparator jurisdictions.**

Another observation from Figure 3 is that ROCs and the CCL represent the highest proportion of other charges in NI (although both the PSO and CAIR levy are also material), but the cost of ROCs is lower than in GB, where the absolute level of the supplier renewables obligation is currently higher. In RoI, the electricity tax is an immaterial component of overall cost, while the other charges are dominated by the PSO charge.

⁸ In interpreting this data, we note that the pure average network charges are now shown on the basis of the actual tariffs set at the beginning of each tariff year and the forecasted consumption for that year. The only exception is transmission UoS tariffs (TUoS) in RoI, which are based on outturn revenues and consumption. To assist like-for-like comparisons between NI and RoI, we have incorporated the SSS levy within the TUoS tariff. The CCL and electricity tax is imposed only on non-domestic customers (and there are other exemptions and differences for certain other customer groups or individual customers), but for the purposes of showing the average charges, we have spread the CCL and tax costs across total consumption (for all customers). Also, the CCL and electricity tax rates are those that apply for the relevant financial or tax year (which do not strictly correspond to the effective rate paid within a given tariff year).

1.3.3 Conclusions on average network tariffs and charges

The conclusions from the assessment of network tariffs and charges across the entire customer base are as follows:

- o NI's pure network charges (excluding other charges) are broadly similar to those in the two selected GB jurisdictions and significantly lower than RoI.
- o On a like-for-like basis, the analysis suggests that **NI's network charges inclusive of other related charges would be below those in both GB and RoI.**
- o Although pure network charges in NI are significantly below RoI tariffs, once other charges are added, the difference is considerably lower as the NI 'other' charges are much larger in both absolute and proportionate terms.
- o The ROCs and CCL represent the most significant component of additional charges in NI. The electricity tax in RoI (which is the equivalent to the CCL) is negligible, while the PSO in that jurisdiction dominates other charges (the level of the PSO levy in turn is partly due to the cost of supporting renewable generation).

1.4 Larger customers bear more costs

In the previous Section we considered the overall average network and related charges in the different jurisdictions and concluded that NI's tariffs inclusive of other charges are, on average, lower than those in the other jurisdictions. In this Section, we compare the charges for selected customer categories between jurisdictions and attempt to understand how the variation in charges results from differences in:

- o the levels of average costs in the jurisdictions,
- o the levels of other charges, and
- o how the costs and charges are allocated to different customer categories⁹.

1.4.1 Choice of customer categories for comparison

For the purposes of discussing network and related charges across customer categories, we focus on a subset of categories representing two-thirds to four-fifths of total electricity consumption in the various jurisdictions¹⁰. Specifically, the NI tariff categories considered are the following:

⁹ We remove underlying differences between jurisdictions in average tariff levels by normalising for NI average revenues. Customer mix also influences the average tariffs in the different jurisdictions, so this is also normalised. This enables us to separately identify the cost differences attributable to the total average network tariff levels and the costs attributable to the allocation mechanism (or tariff design).

¹⁰ The analysis considers eleven customer categories but the discussion in the Report focuses on only five.

- o **T011**, which is the standard domestic rate covering the majority of residential customers
- o **T031**, which covers most of the small commercial/industrial customers
- o **T101**, which represents industrial, commercial and miscellaneous customers with demand above 70 kVA and below 1 MW.

These three categories represent the largest groups by MWh sales; the other tariff categories are relatively small in terms of percentage sales. Nevertheless, given concerns that large I&Cs may be paying relatively more compared to other tariff categories, we also include the following tariff categories in the comparative analysis:

- o **T202**, which includes large I&Cs with demand above 1 MW and who are connected to the high voltage distribution network
- o **T303**, which covers large I&C customers also with demand exceeding 1 MW, but who are connected to the extra-high voltage distribution network.

For the purposes of conducting the comparisons, these NI tariff categories have been mapped to the equivalent categories in the respective jurisdictions. Some assumptions have necessarily been made to make these comparisons.

1.4.2 The allocation of costs depends on the tariff designs

The designs of the network tariffs are relevant because they are the **primary mechanism by which costs are allocated to the different customer groups**.

The key differences between the network tariffs in NI compared with RoI and GB are that in NI the kWh charges for larger customers are differentiated by time-of-year whereas in the other two jurisdictions they are not. Apart from this, the tariff design structures are broadly similar. Compared with tariffs in RoI and GB, NI's tariff will tend to allocate more costs to the larger industrial and commercial customers whose load is concentrated more heavily in winter months. Although the tariff structures may be broadly similar between the jurisdictions, the relative levels of tariffs charged to the different groups may differ. This is investigated further below.

The analysis only describes how network costs and other charges are allocated through the tariff designs applied to the different customer categories in the four jurisdictions. **We do not comment, and were not asked to consider, whether the tariff designs are more or less cost reflective in the different jurisdictions.**

1.4.3 Comparative average charges per customer category

The total charges per customer category in the different jurisdictions are shown in Figure 4. Core network UoS charges are shown in the bottom segment of the bars and the other charges appear in lighter shades and within a broken line border at the top of the bars. The sum of the network and other related charges appears above the bars.

Broadly, the graph shows that all-inclusive charges are higher in NI for some customer categories, lower for some, and about the same for others.

One key observation that can be made is that compared with RoI, NI's all-inclusive charges for all large I&C customers (including T101) are now higher (and significantly so for the T202 and T303 categories), but they remain lower than RoI for the T011 and T031 tariff codes.

Compared with GB, NI's tariffs for categories T202 and T303 are lower.

Another key observation is that the 'other' charges in RoI are significantly lower than both NI and GB, and generally decrease with customer size. By contrast, in both NI and GB other levies and charges are generally higher for the larger customers and form a significant component of the total charges paid by these customers.

Figure 4 Total network and other charges by customer category (p/kWh, 2012/13)

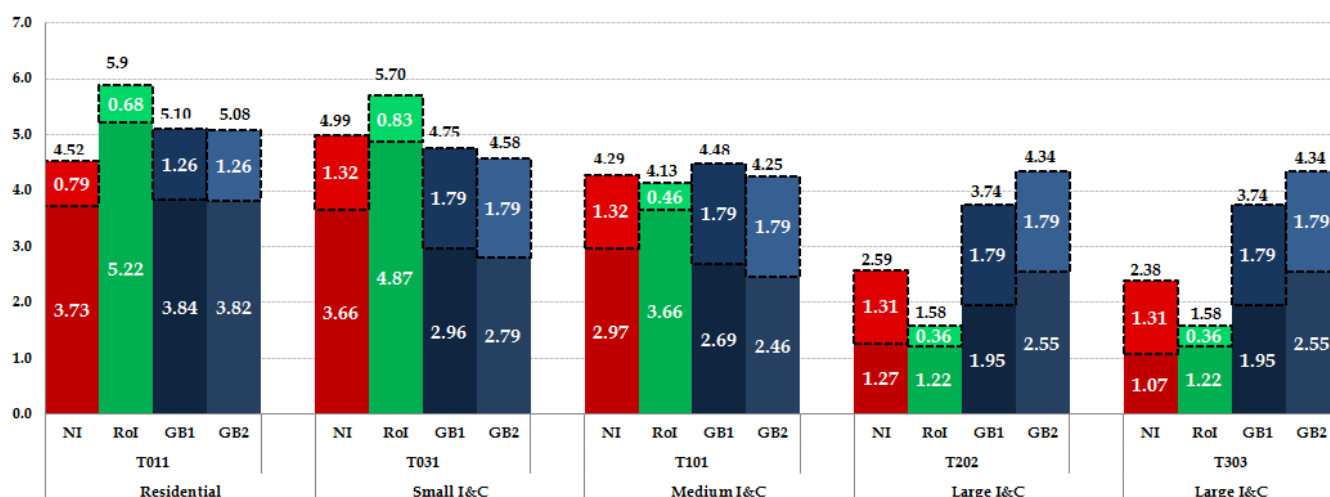


Table 2 below further demonstrates that:

- o The absolute level of 'other' charges are much higher in NI and GB compared to RoI, and higher amounts are imposed on medium and larger sized customers in NI and GB, whereas the opposite is true in RoI; that is, the average of other charges for large I&Cs are lower than those imposed on residential customers and smaller I&Cs.
- o In proportionate terms, other charges represent a much higher proportion of the total prices paid by consumers in NI and GB, particularly for the larger customers – the charges in NI, for example, more than double the network UoS charges for the T202 and T303 categories, but add less than a third to the equivalent tariffs in RoI.

Table 2 Uplift to network UoS tariff from other charges (2012/13)

Tariff category	NI		RoI		WPD (SWales)		WPD (SWest)	
	%age of UoS tariff	Amount p/kWh	%age of UoS tariff	Amount p/kWh	%age of UoS tariff	Amount p/kWh	%age of UoS tariff	Amount p/kWh
T011	21.2%	0.79	13.0%	0.68	32.8%	1.26	33.0%	1.26
T031	36.1%	1.32	17.1%	0.83	60.4%	1.79	64.0%	1.79
T101	44.6%	1.32	12.7%	0.46	66.4%	1.79	72.7%	1.79
T202	103.4%	1.31	29.1%	0.36	91.7%	1.79	70.1%	1.79
T303	122.3%	1.31	29.1%	0.36	91.7%	1.79	70.1%	1.79

1.4.4 The build-up of the cost differences

The previous sections have shown that:

- o NI's core network costs are lower than RoI and comparable with GB
- o NI's other charges are higher than RoI and lower than GB
- o Despite these results, the charges to larger customers in NI are higher than in RoI.

In this final sub-section we summarise the analysis to show the relative contribution of tariff design (or cost allocations) to the differential total charges between customer categories. For reasons of brevity, we only show the graphs for NI and RoI, but do report on the NI and GB comparison further below. The resulting analysis for NI/RoI is presented in Figure 5 in the form of 'waterfall' graphs for each of the five customer groups forming the focus of the discussion.

The bars at either side are the average of the total network and other charges for NI and RoI respectively and for the relevant customer group. The blocks in between show the relevant contribution of the overall network tariff level, the network tariff design, the level of 'other' charges and their allocation across customers in explaining the difference.

Taking T011 as an example, the actual tariff in NI is 4.52 p/kWh and that in RoI is 5.90p/kWh. RoI's higher cost of 1.38p/kWh can be 'explained' as:

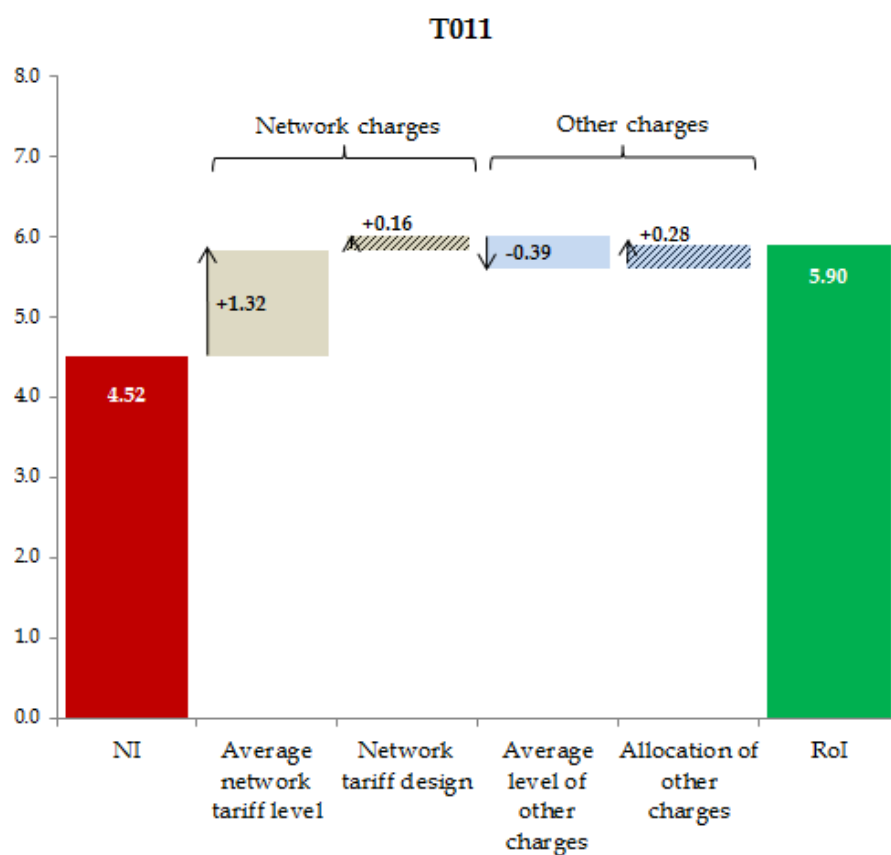
- o +1.32 p/kWh *higher* because network costs in RoI are higher on average
- o +0.16 p/kWh *higher* because RoI allocates more core network costs to T011 customers
- o -0.39 p/kWh *lower* because RoI's 'other' charges are lower than NI on average
- o +0.28 p/kWh *higher* because RoI allocates more of the 'other' charges to T011.

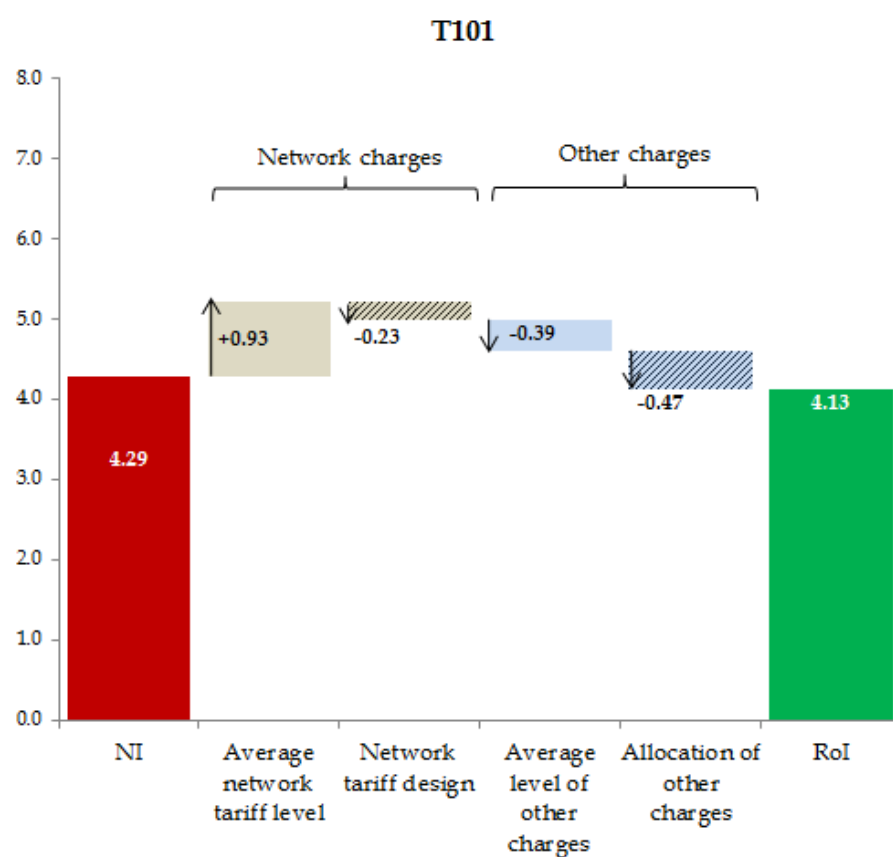
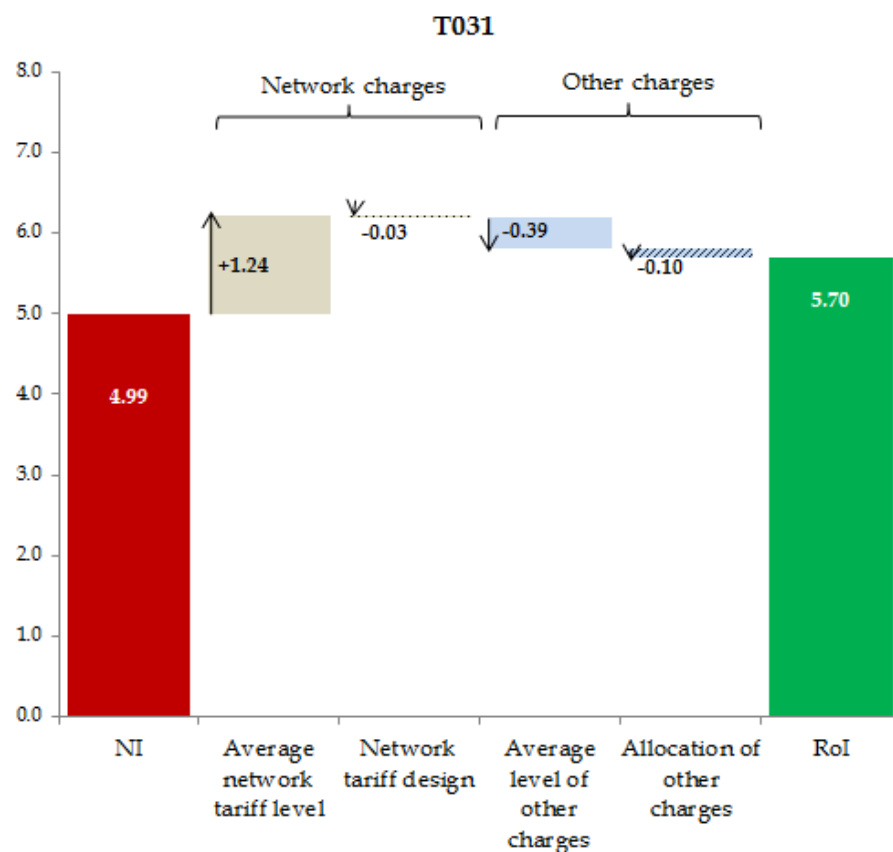
The differentials for the other tariff categories are similarly deconstructed in Figure 5.

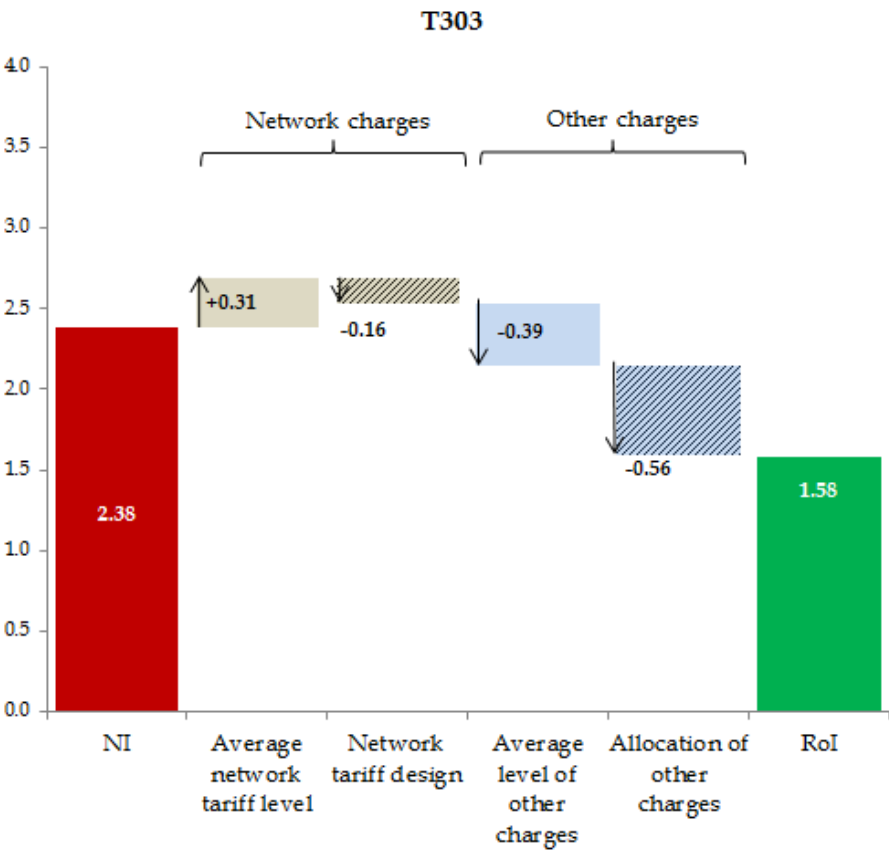
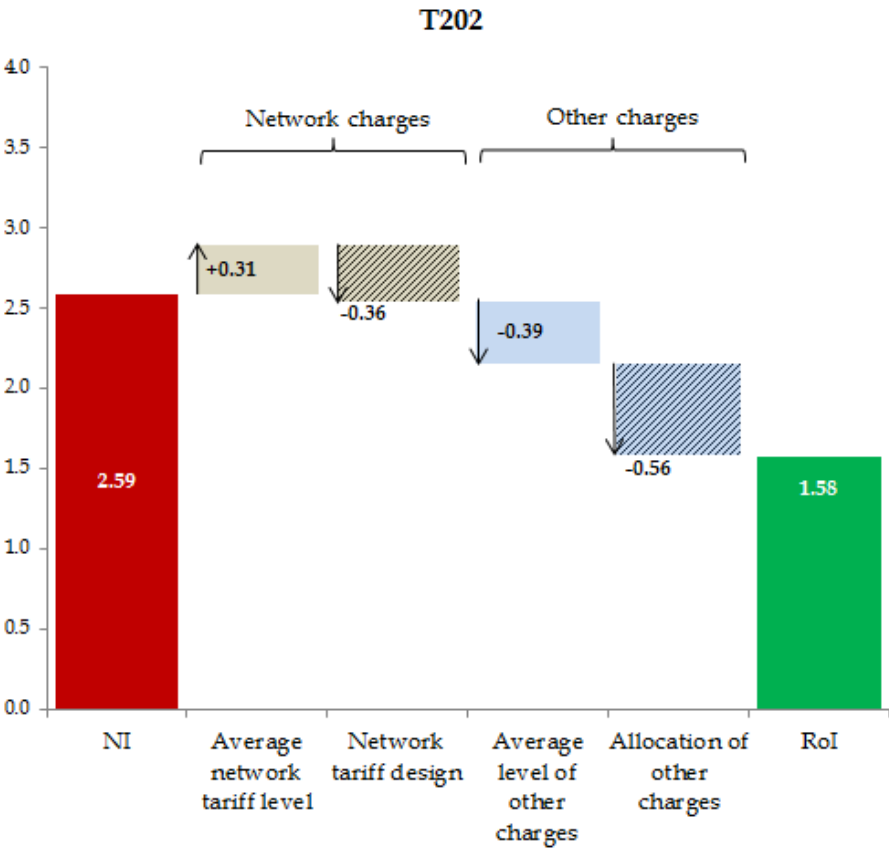
The negative 'allocation' blocks in Figure 5 must balance the positive 'allocation' blocks. For example, the +0.16 p/kWh higher charge for T011-equivalent customers in RoI must be balanced by lower charges to other customers such as T101, T202 and T303. Because residential sales are a large part of total MWh sales in NI, it is possible for a relatively small +0.16 p/kWh for T011 customers to balance the -0.23 p/kWh, -0.36 p/kWh and -0.16 p/kWh for T101, T202 and T303 customers shown in Figure 5.

Overall, Figure 5 indicates that **larger customers in NI bear more of the core network costs and, particularly, more of the other charges, compared with equivalent electricity consumers in RoI**. This is partially offset by lower network costs in NI, but exacerbated by higher other costs. The Terms of Reference did not request the Consultant to assess whether the tariff designs are cost reflective or otherwise; nor were we asked to review the basis for the allocation of the other charges by customer category.

Figure 5 Build-up of the cost differences (NI-RoI) (p/kWh, 2012/13)







Below we present similar information for the NI-GB comparison but in tabular format. To keep the analysis simple, we present information only for the South Wales distribution area. As before, at either end we show the average tariffs for the five customer categories in each of the jurisdictions and the columns between the two show how the network tariff level; tariff design, the level of add-on charges and the allocation of the latter contribute to the observed charging differences. The picture that emerges is very different from the NI-RoI comparison above. Specifically, the table demonstrates that:

- o The overall network tariff levels (as discussed previously) are comparable between the two jurisdictions and therefore these contribute nothing or only a negligible amount to the difference in total network and other charges for all customer categories
- o There are nevertheless differences in tariff design, with NI allocating fewer costs to the T031 and T101 categories but more to residential customers and the larger I&Cs, particularly the latter
- o The 'other charges' in GB are higher (especially due to ROCs) so these serve to raise GB charges relative to NI
- o Interestingly, however, the allocation of the other charges is broadly similar with NI so the allocation mechanism of the add-ons does not contribute to the differences in charges between customer groups in the respective jurisdictions.

Table 3 Build-up of the cost differences (NI-GB) (p/kWh, 2012/13)

Tariff code	NI average charge (UoS + 'other')	Difference due to:				GB (SWales) average charge (UoS + 'other')
		Average network tariff level	Network tariff design	Average level of other charges	Allocation of other charges	
T011	4.52	-0.01	0.12	0.46	0.00	5.10
T031	4.99	-0.01	-0.69	0.46	0.00	4.75
T101	4.29	-0.01	-0.27	0.46	0.00	4.48
T202	2.59	0.00	0.69	0.46	0.01	3.74
T303	2.38	0.00	0.88	0.46	0.02	3.74

1.5 Study conclusions

The present study was motivated by a need to understand the degree to which differences in end-user electricity prices between comparable jurisdictions to NI identified in previous UR analysis could be explained by network and other 'pass-through' charges. It also began on an untested premise that overall core network tariff levels are not a significant contributing factor to such differences; rather, it was believed that observed variances could be due to the level and allocation of non-network charges, as well as the allocation of network costs across customer categories. This study has generally confirmed these suppositions.

The first part of the analysis examined the total allowed network revenues per kWh (across all customer groups) and the components of both pure network tariffs and 'other' charges that could account for any differences. This revealed that **NI's underlying fundamental network charges are broadly similar to those in the two selected GB jurisdictions and significantly below those in RoI**. While pure network charges in NI are significantly below RoI tariffs, once other charges are added, the difference is considerably narrowed as the **NI other charges are much larger in both absolute and proportionate terms** compared to RoI.

Any observed differences between what particular customer groups in NI pay relative to RoI and GB could therefore only be explained by the allocation of the average allowed tariff/revenues and/or additional charges **between** customers. This formed the subject of the second part of the analysis, where we focused on the three largest customer groups in NI (by MWh sales), namely the residential (T011), small I&C (T031) and medium to large I&C (T101) customers and their equivalent groups in RoI and GB, plus two larger I&C tariff categories (T202 and T303) given concerns that the larger I&Cs may be paying relatively more in NI compared to other tariff categories.

The broad conclusion of this analysis (which confirms the initial inference) is that **relatively fewer costs are allocated (through the tariff design) to large I&C customers in RoI** compared to NI (which in turn allocates fewer costs to these customers compared with GB). Moreover, because RoI has lower 'other' charges and also allocates relatively smaller proportions to its larger customers, **the differential between RoI and NI/GB widens further for these customers when all-inclusive charges are compared**.

2 Background

2.1 Study motivation and previous findings

The Utility Regulator (UR) has recently sought to understand the drivers of final end-user electricity prices in Northern Ireland (NI). UR's previous work¹¹ has revealed that:

- o Electricity prices for larger non-residential consumers in NI are among the highest in Europe
- o Prices for smaller non-domestic and residential consumers are less divergent.

UR has further identified that network cost issues could be a significant factor in (at least, partially) explaining these differences, as network charges constitute around 25-30 per cent of final electricity prices. However, responses to a previous UR consultation paper have also suggested that:

- o On the whole, higher absolute network use of system (UoS) charges are not a significant factor in the final electricity price differentials between NI and other jurisdictions, although other charges levied or collected by network operators could be contributing factors
- o Large industrial and commercial (I&C) customers may be disproportionately shouldering network costs compared with other jurisdictions, thereby resulting in relatively higher network charges (and therefore final electricity prices) for this particular customer segment compared to smaller customers.

2.2 Study objectives

The UR has just concluded work with assistance from Economic Consulting Associates Ltd to systematically address the above issues and in particular with a view to:

- o Analysing the differences in and the key costs leading to network-related allowed revenues
- o Providing comparisons of the overall level of transmission and distribution network and related charges in each of NI, the Republic of Ireland (RoI) and relevant comparators in Great Britain (GB)

¹¹ NI Electricity Prices: Data and Comparisons (26 March 2013), http://www.uregni.gov.uk/publications/information_paper_on_northern_ireland_electricity_prices_data_and_comparison, and NI Electricity Price Transparency: follow-up paper (4 November 2013), http://www.uregni.gov.uk/publications/follow-up_paper_on_northern_irelands_electricity_price_transparency.

- o Examining and analysing the allocation of network costs across customer categories in the respective jurisdictions.

3 Scope and approach

3.1 Charging levels and tariff structures

In order to understand whether network and associated charges contribute to price differences between jurisdictions (and in what way), the assessment is divided into two main parts:

- o **Average allowed revenues:** the first part primarily examines the total allowed network revenues per kWh (across all customer groups) and the cost drivers affecting those allowed revenues, and it also describes other charges that are levied (mostly, but not exclusively) at the network level (this forms the subject of Section 4)
- o **Allocation of revenues to customer groups:** the second part is concerned with the structure of network and related charges and understanding how the revenues are allocated between customers or, equivalently, how the allowed revenues are captured from customers through the various tariff designs (this is addressed in Section 5).

Importantly, we do not assess what the correct tariff designs and associated cost allocations should be – the analysis only entails examining and describing **how** the tariff designs contribute to differences in tariff levels charged to different customer groups.

3.2 Choice of jurisdictional comparators

The jurisdictions and/or distribution network areas with which NI charges are compared are RoI and the South West and South Wales areas operated by Western Power Distribution (WPD) in GB:

- o **RoI** is an obvious choice as its electricity network is physically linked and shares many of the same cost drivers as NI, though RoI has a larger system both geographically and in terms of load. RoI also serves a more rural population and its load density is lower.
- o The two GB networks in **South West** and **South Wales** are larger than NI or RoI, so costs ought to be lower because of economies of scale. The South West network includes the tourist areas of Cornwall, Devon, etc., and the load therefore tends to be more commercial and less industrial, while the Welsh network, particularly South Wales, tends to be more industrial and has a greater load density, and has more similarities with NI.

It is useful to compare NI with jurisdictions that are similar, but it is also valuable to compare NI with areas that have some differences because it aids understanding of whether those disparities may contribute to variations in electricity charges.

3.3 Nature of charges to be compared

3.3.1 Composition of final electricity prices

Electricity tariffs to end-users broadly include:

- o Wholesale (generation and/or import) costs
- o Transmission and distribution network costs
- o Supply or retail costs and margin
- o Miscellaneous other charges and levies.

The build-up of average charges to customers in NI in 2012/13 and 2013/14 has been previously calculated by UR as shown in Figure 6 below.¹²

Figure 6 Build-up of NI's average end-user electricity prices										
Wholesale costs	+	SSS charges & cairt	+	PSO levy	+	Use of systems	+	Supplier charge	+	NIRO costs
Generation costs (cost of procuring electricity), capacity costs, imperfections (costs of electricity constraints), and MO charges		For system planning, operation and dispatch		PSO costs which must be spread across all customers		Costs of transmission and distribution of electricity		Costs to supply electricity to customers eg meter reading, billing		Net costs of NI Renewable Obligation – NIRO costs relate to government obligation to sell a proportion of their output as renewables
2013/14										
58%		4%		2%		22%		9%		2%
2012/13										
62%		3%		2%		25%		9%		1%

Source: Power NI's July 2013 Tariff Review, a Regulatory Briefing, May 2013, http://www.uregni.gov.uk/uploads/publications/Retail_Tariff_Background_Briefing_May_2013.pdf.

The charges that are the focus of this study are those that are neither wholesale nor retail. These are:

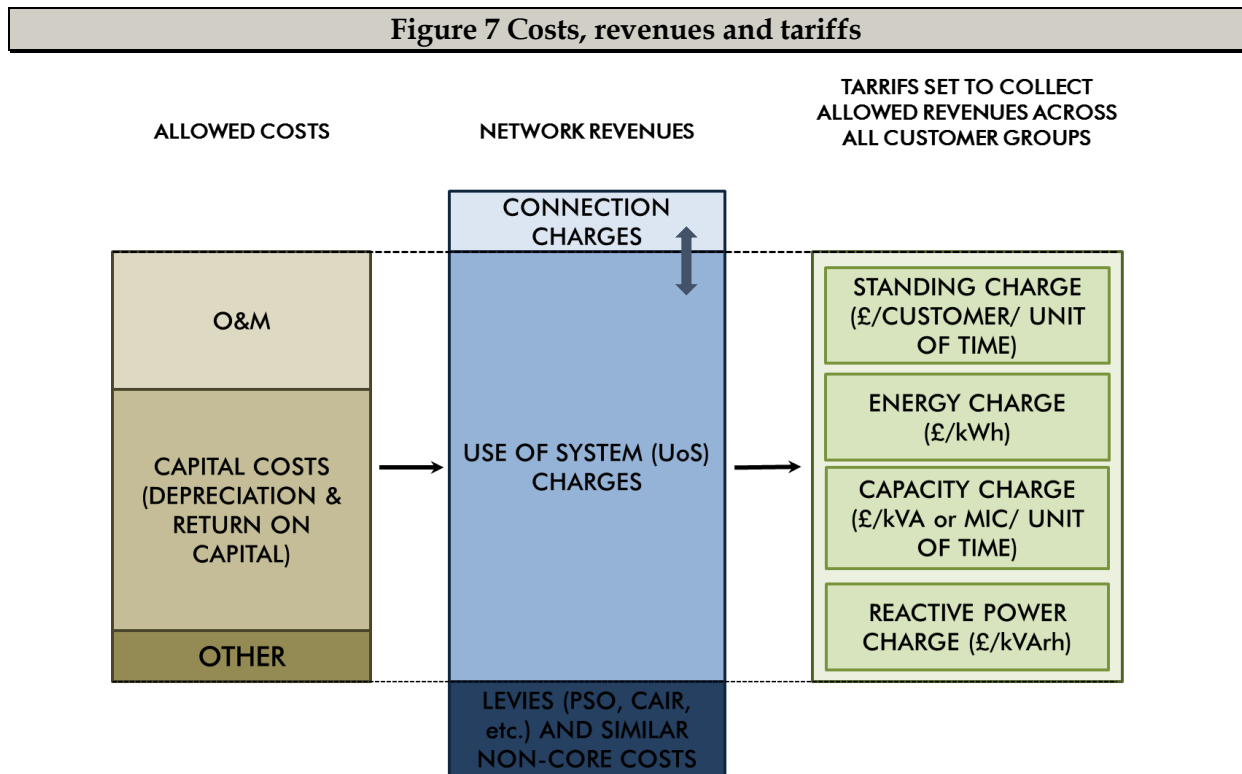
- o The (transmission and distribution) **network tariffs** which represent between 22 and 25 per cent of the total charges (shown within the bold rectangular box in the figure and labelled "use of systems")
- o **Levies or obligations** that may be associated with or linked with the transmission and distribution licensees (or retail suppliers). These are the

¹² The totals do not add up to 100 per cent, as we have excluded the adjustments from 'correction factors' for reasons of simplicity and legibility.

charges within the dotted boxes and represent 6 to 8 per cent of average end-user charges. We refer to these levies and obligations as 'other' costs or charges¹³.

3.3.2 Relationship between costs, revenues, network tariffs and other charges

The relationship between costs, revenues and tariffs and the sub-components of costs and charges that are the focus of the present study is illustrated in Figure 7.



As shown in the figure:

- o The **allowed costs** (left hand column) are the costs of running the network business and include staff and other operating costs, depreciation charges, return on capital and miscellaneous 'other' costs (e.g. licence fees)
- o The **allowed network revenues** (light blue area in the central column in Figure 2) need to match the network costs (in the first column) but revenues to be collected from customers may have additional components including:
 - o connection charges that should recover connection costs
 - o other levies that are collected (primarily) by the network operators on behalf of third parties - levies may be a simple p/kWh add-on to the core UoS tariffs but to make the inter-jurisdictional comparisons more difficult,

¹³ Some of these 'other charges' have since been renamed or replaced by alternative schemes (such as the Renewable Obligation Certificates, instead of the NIRO), while the 'Climate Change Levy' is missing from the graph. The charges examined in the present study are described in Section 3.3.3.

these non-core charges may be levied in different ways and imposed through different parts of the supply chain (e.g. through suppliers rather than network operators)

- o The allowed costs and revenues (i.e. other than those collected as connection charges and other levies) are then recovered from customers through **UoS tariffs** which may be more or less complex depending on the jurisdiction and the type of customer (right-hand column).

3.3.3 Some key charging differences between the jurisdictions

When assessing revenues and tariffs across the jurisdictions and distribution areas, it is important to note that such comparisons are not strictly like-for-like and are necessarily imperfect (even ignoring the underlying differences in network cost drivers). Key differences arise both from:

- o the nature of the costs that are recovered from UoS tariffs, and
- o the specific levies and charges applying in the respective jurisdictions.

Different costs recovered from UoS tariffs

In both NI and RoI, **connection costs** have been partially cross-subsidised in the past from network charges, such that customers only paid a portion of the costs of connecting them to the network (this policy continues to apply in RoI). The connection costs not borne by customers were/are included in the regulatory asset base (RAB) of the network providers and therefore their allowed UoS revenues – this is indicated in Figure 7 above by the double-sided arrow between the connection and UoS charges boxes in the middle column.

This policy was changed in NI as of 1 October 2012 and the costs relating to connection applications received after this date are fully recovered through connection charges. However, there will be a legacy of applications received prior to this date but implemented after 1 October that will be subsidised and there will also be a legacy of connection assets in NIE's RAB, the capital costs of which will continue to be collected through UoS tariffs. This means that overall, because of differences in policies on connection charges, UoS tariffs in NI, RoI and GB will, all else being equal, be different:

- o **RoI** tariffs would be the **highest** because RoI UoS charges 'cross-subsidise' 50 per cent of connection costs versus 40 percent in NI, and the RoI policy continues to apply whereas it has ceased in NI
- o **NI** charges would be the **next** highest, given that only legacy costs and/or applications impact UoS tariffs, and
- o **GB** would be **lowest**, where (separate) connection charges are set to fully recover connection costs.

In future, the gap due to connection charging policies between NI and GB would narrow, though RoI would remain high relative to the other two (assuming the current connection policy continues).

Comparison between GB and NI/RoI will also be distorted because Northern Ireland Electricity (NIE) is responsible for **meter assets and meter reading** while in GB metering is handled by independent companies. Put differently, the allowed costs in the left-hand column of Figure 7 include meter-related costs in NI, but not in GB. However, comparisons between NI and RoI will not be distorted (for this reason) because, like NIE, ESB Networks is also responsible for metering.

Variances in levies and obligations

Other (non-wholesale or retail) costs that are typically included in end-use electricity prices can include:

- o ancillary services, balancing services and transmission system operator charges
- o renewable energy levies or obligations
- o climate change levies or obligations
- o various other public service obligations (PSOs), which generally seek to achieve broader government policy objectives and impose costs that are recovered from all (or sometimes particular segments) of the market.

Some costs may be incurred as a levy while others may be incurred by a licensee indirectly through an obligation imposed on generators, network operators or suppliers. Importantly, such levies or obligations may be imposed differently in different jurisdictions. Moreover, there may not be equivalent costs or charges in all of the jurisdictions.

For the comparisons in this study, we take as our starting point all such charges that are linked to the NI networks, but also include some additional charges or obligations that are applied at the retail level and are effectively cost pass-through items. Comparisons therefore between jurisdictions may be distorted if there are equivalent levies or related costs that are included in one jurisdiction and not in another (say, because they are included with wholesale charges in the latter). The comparisons will **not** be distorted if there are charges that are levied in one jurisdiction but not at all in another; in this case, the added charge in the relevant jurisdiction helps to explain the cause of some of the difference with the comparators.

Specific levies and charges included in the analysis

In NI, there are three charges that are included with network tariffs. These are:

- o the System Support Services (SSS) levy

- o the Collection Agency Income Requirement (CAIR) charge¹⁴
- o a PSO levy.

In addition to these charges, this study examines:

- o renewable obligation certificates (ROCs), and
- o the Climate Change Levy (CCL).

Although these last items are levied or imposed at the retail level, they represent additional costs passed through to third parties and which may explain differences between NI electricity charges and those in other jurisdictions. Also, as discussed below, costs associated with renewable generation are included in the PSO in RoI, so inclusion of ROCs is also necessary for ensuring a like-for-like comparison. The cost comparisons also include the Demand Side Management Charge (DSMC) in RoI, as this is an additional network related charge paid by all customers in that jurisdiction. Finally, support of the East-West Interconnector (EWIC) is provided for in the RoI transmission allowed revenues and the associated TUoS charges; this has no equivalent in the other two jurisdictions.

All the 'other' charges and their equivalents in RoI and GB that are included in the analysis are summarised in Table 4 and are further discussed below.

Table 4 Summary of other costs included in cross-jurisdictional comparisons

NI (or RoI) levy or obligation	<u>Presence of same or equivalent charge in jurisdictional comparison</u>		
	NI	RoI	GB
SSS levy	✓	✓	✗ ¹⁵
CAIR charge	✓	✗	✗
PSO charge	✓	✓	✗
ROCs	✓	✓ (PSO)	✓
CCL	✓	✓ (Electricity tax)	✓
DSMC	✗	✓	✗
EWIC	✗	✓	✗

The **SSS levy** in NI covers the cost of the System Operator for Northern Ireland (SONI) and of ancillary services required to operate the transmission system safely and reliably. It is charged as a flat unit rate per kWh, which is common for all customers. In RoI, through the

¹⁴ Support for the Moyle interconnector.

¹⁵ The SSS-equivalent costs in GB are included in National Grid charges. The GB comparisons only cover the distribution companies and not National Grid. The GB distribution companies' network assets are comparable with the transmission and distribution networks in NI and RoI.

harmonized single energy market (SEM), the same charges are applied, but they are incorporated in network (i.e. transmission UoS) charges. In GB the equivalent charges are not included in network tariffs (for the distribution companies) but, instead, are charged by National Grid to suppliers and end users. To this extent, all else being equal, network related charges in GB would need to be increased in order to make them comparable with NI and RoI. In NI, SSS charges represent between 12 and 14 per cent of core network charges.

The **CAIR charge** is used to recover the shortfall (from capacity sales), if any, of the revenue required for the Moyle Interconnector (linking the NI and Scotland electricity grids). SONI collects money to cover this shortfall and passes it on to Moyle Interconnector Limited. There is no equivalent in RoI or GB. Including CAIR in the comparison between NI, RoI and GB is therefore helpful in understanding the reasons for cost differences facing consumers. CAIR charges represented 6-9 per cent of core network charges in the last two years (and were previously zero). This is also a common unit charge per kWh across all customer groups.

The **PSO levy** in NI covers a range of costs including renewables (although these are now met through the ROC scheme – see below), legacy generation costs, retail market IT costs, Northern Ireland Sustainable Energy Programme (NISEP) energy efficiency incentive scheme, and a ‘K factor’ adjustment for over- or under-recovery of revenues in previous years. Of these, currently, the material charges are the NISEP (energy efficiency incentive) scheme and retail IT costs – these each represent a reasonably significant uplift to core network charges of around 3-4 per cent (in 2012/13 and 2013/14). In this respect, we note the following:

- o The **NISEP** equivalent in GB is imposed as an obligation on suppliers, so this is a potential distortion (when comparing charges). In RoI, we understand that suppliers are encouraged to introduce energy efficiency measures, but these are voluntary. Comparisons between NI and RoI therefore do not require any adjustment but comparisons between NI/RoI and GB would require GB charges to be increased.
- o There are no equivalents to the **retail market IT costs** in GB because there have been no similar costs over the recent past. In RoI, retail market enhancement costs were allowed in the second price control (2006-10) and included in the RAB. None were included in the third price control (‘PR3’, 2011-15) in RoI but they may remain in the RAB (though IT assets tend to have short asset lives i.e. they are depreciated quickly). PR3 did allow the possibility of pass-through of retail IT costs into the RAB and UoS charges. We feel that no adjustment would be needed to the GB or RoI charges in order to make them comparable with NI.
- o **RoI also has a PSO charge**, which supports peat, gas and renewable generation plants consistent with the RoI government’s policy for ensuring security of supply (including through the use of indigenous fuels) and promoting renewable energy generation. To the extent that the costs of renewables are covered by equivalent mechanisms (namely ROCs) in NI and GB, inclusion of the PSO charge for RoI ensures a like-for-like comparison. Other elements of the PSO would explain differences in PSO levels between NI and RoI and also GB (where no equivalent charges exist).

- o The **PSO in NI** is charged to all customers at a **constant unit rate** per kWh of consumption, which is in contrast to RoI where medium-sized and large I&C customers are charged based on their maximum import capacity (MIC) whereas all other customers are charged a fixed fee per customer based on customer type (residential or small I&C).

The **ROCs** are certificates issued to operators of accredited renewable generating plants for the 'eligible' renewable electricity they generate. In the UK, electricity suppliers are required to source an increasing proportion of the electricity they supply from renewable sources and use ROCs to demonstrate that they have met their obligation. Where suppliers do not present a sufficient number of ROCs to meet their obligation, they must pay an equivalent amount into a 'buy-out fund'. In RoI, the support mechanism for renewable electricity projects is the renewable energy feed-in tariff (REFIT), the cost of which is incorporated in the PSO. Inclusion of ROCs, therefore, allows a like-for-like comparison across jurisdictions.

CCL is a UK tax on electricity use essentially aimed at promoting energy saving (or, alternatively, discouraging high energy consumption) and is a common unit rate per kWh paid by all electricity consumers, excluding residential customers, other 'small users' and charity organisations, and certain businesses that meet specific exemption criteria.¹⁶ The equivalent in RoI is an electricity tax, which also exempts residential customers, but is at a much lower rate than UK CCL levels.¹⁷

Finally, **DSMC** in RoI is a charge that allows the transmission network provider, EirGrid, to recover the costs associated with a winter demand reduction programme under the 'Powersave' scheme. Powersave's objective is to encourage large and medium sized customers to reduce their electricity demand on days when total system demand is close to available supply. In return for reducing demand during 'Powersave Events', participating customers are paid certain amounts on the basis of the kWh reductions achieved.

3.4 Other key parameters and assumptions

In addition to the matters already outlined in this Section 3, there are a number of other assumptions and parameters employed in conducting the comparative analysis, including the following:

- o **Choice of years for comparison:** our analysis has examined the three most recent years, although to keep the presentation of the results tractable, we focus in many cases on the 2012-13 year (being the most recent year for which we have complete data), but this does not alter the generality of the main findings.

In the first instance, when we examine the high level aggregate overall average network UoS tariffs, we use the revenue information as at the start of the current five-year control period in each jurisdiction. This approach allows us to consider

¹⁶ For the purposes of the analysis, we assume all non-residential customers pay the CCL.

¹⁷ The tax is essentially common across all non-domestic customers, namely 0.5 euros per MWh, although some premises such as schools, universities, local and national government offices, the armed forces, etc. pay a higher 1 euro per MWh rate. In our analysis, we have assumed a 0.5 euro rate, as we have no way of distinguishing between the higher paying customers and others.

several years simultaneously and consistently, subject to the differences in the definition of ‘**revenue years**’. That is, in NI and GB, the allowed revenues are set on an April-March year, while in RoI they are set on a calendar year basis. We therefore present the analysis for the three NI and GB revenue years 2012/13, 2013/14 and 2014/15 and for RoI we correspondingly use the 2012, 2013 and 2014 revenue (or calendar) years.¹⁸

All subsequent analysis that examines tariffs together with other charges and network cost allocations between customer categories uses data for the three most recent **tariff years**, although, as mentioned above, a single year (2012/13) has been used for the main comparative analysis. For NI and GB and also distribution in RoI, this analysis is based on the tariffs set at the start of the year that were designed to give the allowed revenue for that year inclusive of all allowed adjustment components (K-factors), however in the case of transmission charges in RoI, the data is on an outturn basis (as we were unable to obtain data on a similar basis with the other jurisdictions). This is another reason for relying on 2012/13 as the main comparator year; in 2013/14 we only have RoI transmission charging data for half the tariff year, which may distort the average tariff over the full year (we would expect the average charges calculated with just half-year data to be higher as they include the winter peak period). We also note that the tariff year in both NI and RoI runs from October to September, whereas in GB it is from April to March. There is therefore again a timing mismatch between the jurisdictions (although we do not believe it materially impacts the results); in this case, we present the analysis for the three NI and RoI tariff years 2011/12, 2012/13 and 2013/14 and for GB we correspondingly use the 2012/13, 2013/14 and 2014/15 tariff years.

- o **Matching of voltage levels:** In NI “distribution” refers to NIE’s assets below 110 kV while “transmission” refers to the network of 110 kV and above. In RoI there is a similar distinction between distribution and transmission. However, in GB the two networks used for the comparisons are operated by WPD and are both referred to in GB as “distribution” networks. These GB networks are at voltages of 132 kV and below (but with no 110kV). Transmission in GB refers to the network above 132 kV, and this is owned and operated by National Grid. For the purposes of comparing charges, we treat WPD’s 132 kV assets as ‘transmission’ and its assets below 132 kV as distribution.
- o **Prices and exchange rate:** to ensure consistent comparisons across years and jurisdictions, all prices referred to in this study are in 2014 constant prices (nominal prices have been converted using the relevant retail or consumer price index in the respective jurisdictions), while charges in euros (in RoI) have been converted to pounds sterling using purchasing power parity exchange rates.

¹⁸ It should be mentioned that the allowed revenues in NI for 2013/14 that were approved by UR will be adjusted to take account of the determination of the Competition Commission. The comparison may need to be revised when the allowed revenues and associated tariffs are finalised.

4 Comparison of average network charges

The fundamental questions to be answered in this part of the analysis are:

- o How have overall (i.e. for the total customer base) **average network charges** per kWh differed by jurisdiction over the past three years?
- o What **components of those charges** account for those differences i.e., what was the build-up of network charges in the four jurisdictions over the past three years in terms of both **pure network tariffs and other charges**?

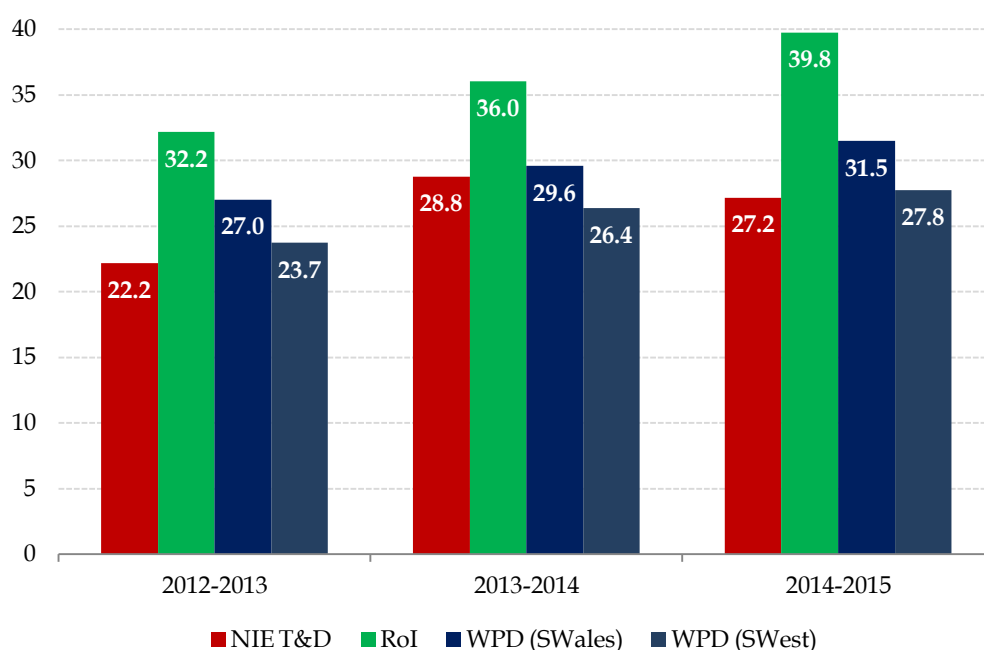
This Section also comments on general drivers for differences in pure network charges such as customer density, aggregate load patterns and regulatory assumptions (e.g., the weighted average cost of capital, or WACC).

4.1 Average network charges in NI, RoI and GB

4.1.1 Comparison of average charges

The average network charges in the three jurisdictions (expressed in pounds per MWh in 2014 constant price terms and covering both transmission and distribution) are summarised in Figure 8 below. These have been calculated using the revenues set at the start of the most recent multi-year control period in the respective jurisdictions/ distribution network areas. They exclude any additional levies or charges and relate purely to the network-related costs and revenues.

Figure 8 Network charges excluding other costs (£/MWh, 2014 price levels)



The above chart shows that:

- o Average pure network charges in RoI, excluding levies and other costs, are consistently higher than both NI and GB
- o NI's average pure network charges are lower than, or similar to, those in GB. More specifically, in the two years 2012/13 and 2014/15, NI charges are lower than both GB networks; in 2013/14, NI charges are below WPD (South Wales) but above WPD (South West).

Over the entire three-year period, NI's average network charges are approximately the same as WPD (South West), about 11 per cent below WPD (South Wales) and more than 30 per cent lower than RoI. Hence, consistent with the responses received during UR's earlier consultation, these results confirm that **network charges are not higher in NI than in the other jurisdictions** when compared on an average basis across all customers and without the addition of other charges.

4.1.2 Assessment of the underlying cost drivers

It is useful to speculate on some of the possible underlying causes of differences between costs and allowed revenues in the three jurisdictions. Here we consider:

- o the build-up of costs
- o the level of the component costs
- o the potential cost drivers
- o available benchmarking of NI's underlying network costs with other jurisdictions.

Build-up of costs

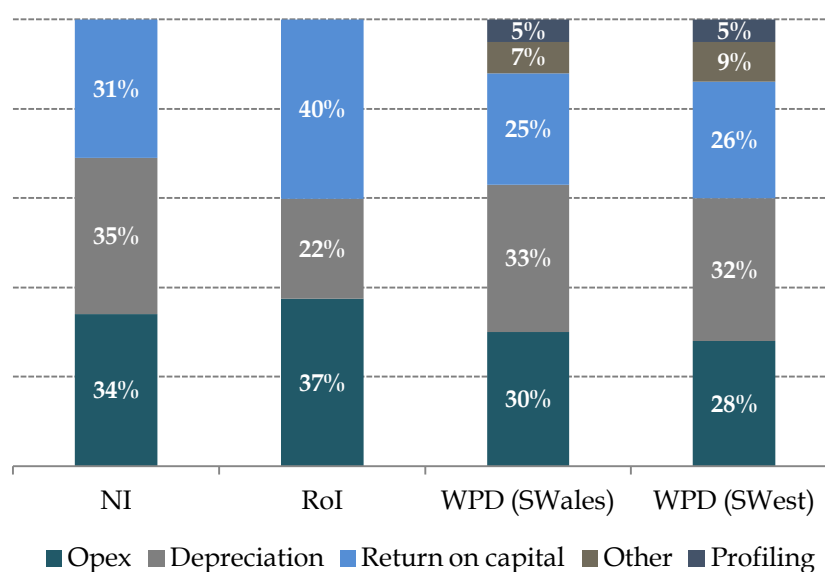
The fundamental network-related costs can be broadly divided into operating and maintenance expenditure (opex), depreciation, rate of return, and other. The division of costs into these categories in the four networks is shown in Figure 9 below for the year 2013/14.¹⁹

This graph indicates that:

- o NI is broadly comparable with GB in terms of the share of costs attributable to opex **and** depreciation together
- o RoI is the outlier in the allocation between depreciation and return on assets, with a substantially larger share of overall costs attributable to the return on assets in RoI than NI or GB.

¹⁹ In the case of GB, the profiling component results from smoothing revenues across the years of the control period to achieve the desired profile of charges, while the 'other' category is dominated by pension-related deficit costs.

Figure 9 Build-up of network costs (2013/14)

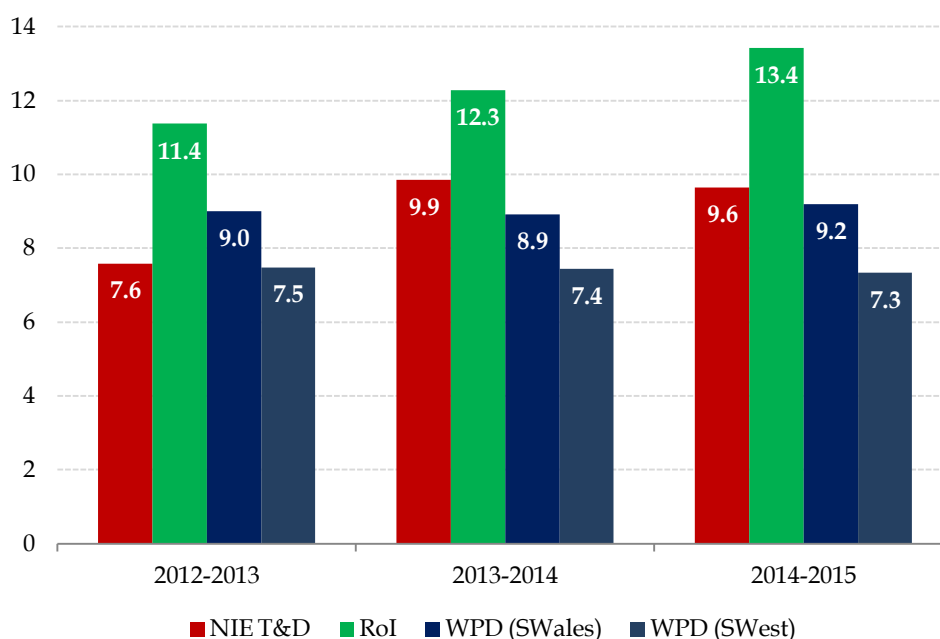


Cost components

The various components of costs are further analysed below.

Opex per MWh is shown in Figure 10. Opex costs in RoI are above those in the other three networks both because the share of opex is greater and the absolute level of overall costs is higher. NI's opex is comparable to or lower than GB in 2012/13 but moves above both WPD (South Wales) and WPD (South West) in the latter two years, although it is lower in all cases than RoI.

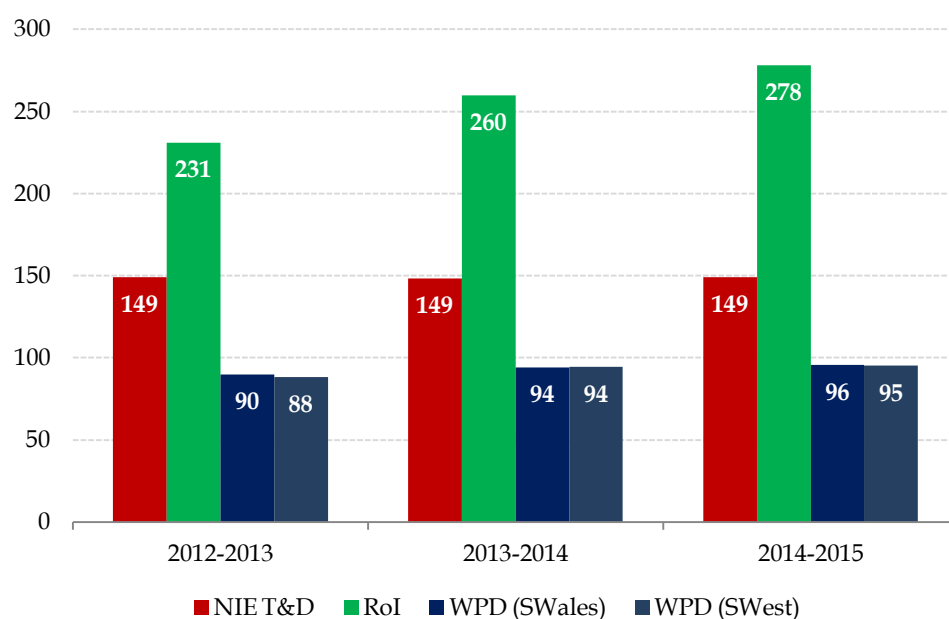
Figure 10 Opex per MWh (2014 price levels)



Turning to capital costs, NI's WACC is broadly aligned with GB. Both jurisdictions adopt a real vanilla WACC. RoI on the other hand adopts a real pre-tax WACC and for this reason is higher (5.95 per cent) than GB or NI (4.55 per cent and 4.69 per cent, respectively). However, even if the WACC is converted to a comparable real vanilla WACC, we estimate that it would still be higher than NI and GB²⁰.

The RAB for the four networks is shown in Figure 11 and as can be seen, the value of the RAB (normalised for MWh sales) is substantially larger in RoI, with NI sitting between GB and RoI. The combination of a relatively high WACC²¹ and RAB leads to the high share of costs attributable to the return on assets for RoI shown in Figure 9 earlier and to the relatively high overall network tariffs for RoI seen in Figure 8 previously. We speculate that this may arise because the assets in RoI are generally more recent than those in the other three jurisdictions. Also, the depreciation rates in RoI are lower (so that the value of the asset base falls more slowly). Specifically, the depreciation period is 20 years in GB compared to 40 years in NI and 45 years for distribution assets in RoI and 50 years for RoI's transmission assets, which means that current and future customers are paying relatively more for the existing assets in NI and RoI. A further explanation is that RoI is undertaking significantly more (over double) capital expenditure (on a per MWh basis) compared to both NI and GB.

Figure 11 Regulatory Asset Base (£/MWh)



Potential underlying cost drivers

Various cost drivers have been used in benchmarking studies of electricity network operators in order to assist with understanding the possible causes of cost differences between operators. These factors have included, among others:

²⁰ According to CER's Decision Paper (CER/10/198), the effective tax rate on the network companies in RoI was calculated by ESB Networks at only 13 per cent.

²¹ This was reduced recently from 5.95% to 5.2% following a decision by CER in response to improving economic conditions in RoI.

- o **Physical geography:** electricity networks in hilly terrain or coastal areas, for example, are more expensive to develop and maintain. In general, the four networks are located in areas with a mix of hills and coasts with broadly similar risks of storms and lightning strikes, analogous levels of sea pollution, and a comparable mix of protected areas. A non-scientific assessment suggests to us that this is unlikely to be a major cause for cost differences.
- o **Cost of inputs:** transformers, switchgear, lines and cables will all be purchased from similar suppliers and the costs should therefore be much the same between the three jurisdictions.
- o **Labour costs and labour productivity:** there are differences in labour costs between the jurisdictions, but we believe that the differences between the four networks should be relatively small in the context of the overall cost structure of the businesses.
- o **Network planning and operating standards:** these are broadly similar across NI, RoI and GB.
- o **Customer mix and load density:** RoI has a relatively high system load factor compared with the two GB networks and NI. In NI, the system load factor in the past three years has been between 52 and 56 per cent and in the two GB networks it has been between 50 and 57 per cent, while in RoI it has been between 63 and 69 per cent. High load factors are often associated with industrial loads which, in turn, tend to imply more concentrated loads which are easier for network operators to serve. In addition, because of economies of scale (lower costs per kWh to serve large customers), other things being equal, high load factors should lead to lower costs in RoI compared with NI and GB. This driver runs counter to the observed high costs and charges in RoI.
- o **Population density:** as shown in Table 5, RoI in particular has a much lower population density than GB. NI is intermediate between the two jurisdictions. Population density impacts on the cost of developing networks to supply remote customers and on the cost of maintaining those networks. This could contribute to higher costs and network tariffs in RoI.

Table 5 Population density

Jurisdiction	Population per km ²
Northern Ireland	61
Republic of Ireland	32
GB, South Wales – South West	93 - 108

Additionally, costs associated with the East-West Interconnector (EWIC) are included in the TUoS allowed revenue in RoI and this accounts for around €50 million per year of TUoS costs over the period 2013-2015.

Benchmarking

In April 2014, the Competition Commission (CC) published its final determination on NIE's allowed revenues and tariffs. This included a partial assessment of NIE's costs in comparison with the cost levels of the 14 distribution network operators (DNOs) in GB. The benchmarking study considered only NIE's:

- o indirect costs, and
- o costs for inspection, maintenance, faults and tree cutting.

The latter includes the main elements of what Ofgem refers to as network operating costs.

CC's benchmarking, using CC's preferred econometric model and parameters, suggested that NIE's ranking among the 15 DNOs (inclusive of NIE) was 7th or 8th on a like-for-like basis where 1st represented the most efficient and 15th the least efficient²². For the purposes of setting allowed operating costs, CC suggested that the target should be the 5th rank. This tends to suggest that NIE is slightly below the efficient target in terms of these cost components, but as it sits midway among comparators it is still more efficient than half the DNOs used in the benchmarking exercise.

4.2 Average network tariffs plus other charges

In Figure 12 below we show network charges and all the 'other' charges described in Section 3.3.3 i.e. network-associated levies and costs, plus other relevant pass-through costs imposed at the supply level in NI for the 2012/13 year (in both absolute and proportionate terms). Table 6 shows similar information in tabular format, but for NI and RoI alone and for all three recent tariff years. In interpreting this data, we note the following:

- o The pure average network charges are now shown on the basis of the actual tariffs set at the beginning of each tariff year and the forecasted consumption for that year, with the exception of transmission UoS tariffs (TUoS) in RoI, which are based on outturn revenues and consumption²³.
- o To assist like-for-like comparisons between NI and RoI, we have incorporated the SSS levy within the TUoS tariff and this is therefore not shown separately. However, this does distort comparisons with GB where the equivalent charge is imposed on suppliers directly and is not incorporated in the data shown here (that is, GB network charges would need to be uplifted to make them comparable to NI and RoI).
- o The CCL and electricity tax is imposed only on non-domestic customers (and there are other exemptions and differences for certain other customer groups or

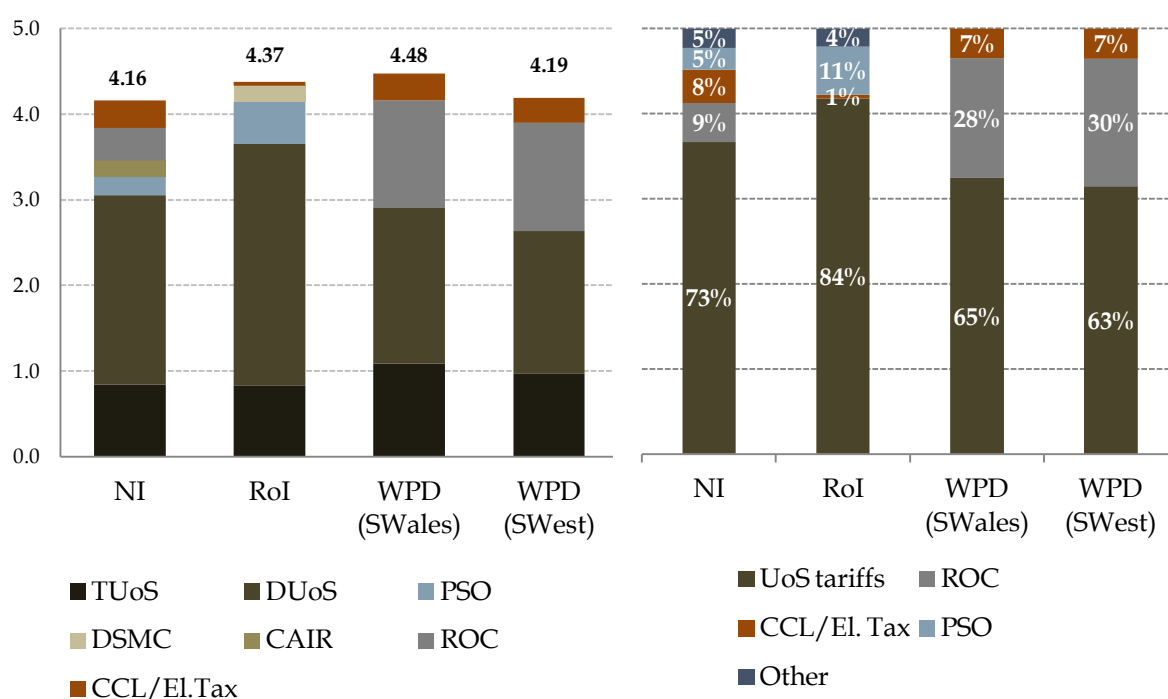
²² Table 8.4 of the CC final determination. CC's preferred models were M4 and M6 and their preferred wage adjustments were WA1 and WA2. See paragraph 8.224. https://assets.digital.cabinet-office.gov.uk/media/535a5768ed915d0fdb000003/NIE_Final_determination.pdf

²³ This would explain the variation in the average charges shown in Figure 8 and in Figure 12.

individual customers), but for the purposes of showing the average charges, we have spread the CCL and tax costs across total consumption (for all customers).²⁴

- o The transmission component of the overall network charges in NI and RoI is shown in Figure 12 to be lower than it is in GB but this may simply reflect difficulties in preparing like-for-like analysis. For GB, the 'transmission' revenue has been estimated based on WPD's attribution of costs to its 132 kV assets, whereas the transmission charges for NI are based on a specific and regulated division of costs and allowed revenues between the transmission and distribution businesses, whereas in RoI the two network businesses are completely unbundled and separately regulated. The division of charges between transmission and distribution in NI and RoI should therefore be more correct than the division in GB shown in Figure 12 – but it is the total that is most relevant rather than the allocation.

Figure 12 Network charges & other levies/costs in 2012/13 (p/kWh, 2014 prices)



Regarding pure network charges, the graph above (left-hand panel) confirms the earlier findings that NI average tariffs are generally comparable to GB and that RoI average UoS tariffs are significantly higher than both NI and GB. The graph also shows that the inclusion of the other charges that are collected by the network operators and/or suppliers brings average network charges across the jurisdictions closer together. This is because the weighting in overall average charges of the additional levies and costs is broadly inversely proportional to the level of the network tariffs (see right-hand panel) - that is, other charges represent a much more significant proportion of total charges in GB (about a third), which has the lower UoS tariffs, than in RoI (about one sixth), which has the highest average UoS tariffs; NI is intermediate between the two (the other charges are about a quarter of the

²⁴ Also, the CCL and electricity tax rates are those that apply for the relevant financial or tax year (which do not strictly correspond to the effective rate paid within a given tariff year).

total). With the addition of other charges, therefore, **overall average tariffs and charges in NI are at least comparable with and generally lower than the comparator jurisdictions.**

To the extent that the additional charges exist in NI but do not exist in GB and RoI, the above is a fair comparison. For example, there is no equivalent to CAIR in GB or RoI and this is therefore a cost that customers bear in NI that customers do not bear in GB and RoI, and CAIR should therefore be shown in this comparison. However, the SSS levy and some elements of the PSO charges are imposed directly on the suppliers in GB and to this extent the comparison with both NI and RoI is unfair. Hence, focusing on the charges that customers actually pay in the respective jurisdictions, one would expect NI-equivalent tariffs and charges (excluding wholesale and retail costs) to be lower than both RoI and GB.

Finally, another observation from Figure 12 is that ROCs and the CCL represent the highest proportion of other charges in NI (although both the PSO and CAIR levy are also material), but the cost of ROCs is lower than in GB, where the absolute level of the supplier renewables obligation is currently higher. In RoI, the electricity tax is an immaterial component of overall cost, while the other charges are dominated by the PSO charge.

Examining Table 6, which focuses on comparisons between NI and RoI across time, yields similar conclusions:

- o NI pure average network charges are consistently lower than RoI, as are total charges inclusive of other levies and costs.
- o When other charges are added, the differential between the two jurisdictions is minimised – for example, in 2012/13, NI average network UoS tariffs are 0.6 p/kWh below those of RoI, but once other charges are added, including CCL/electricity tax, the difference is 0.2 p/kWh.
- o ROCs and CCL represent the largest component of other charges in NI (with ROCs increasingly becoming more significant), whereas in RoI the PSO (which partly covers the cost of renewable generation through the REFIT scheme) is the most significant other cost (and has become increasingly so over the three-year period).

Table 6 NI and RoI average network & other charges (p/kWh, 2014 price levels)

	2011/12		2012/13		2013/14	
	NI	RoI	NI	RoI	NI	RoI
TUoS (incl. SSS)	0.69	0.65	0.84	0.83	0.74	0.79
DUoS	1.95	2.63	2.22	2.82	2.17	2.87
Average network UoS tariff	2.64	3.28	3.06	3.65	2.91	3.66
PSO	0.42	0.33	0.22	0.49	0.18	0.78
CAIR	0.00	-	0.19	-	0.25	-
DSMC	-	0.31	-	0.19	-	0.01
ROCs	0.29	-	0.38	-	0.44	-
Average total	3.35	3.92	3.84	4.33	3.77	4.46

charges (excl. taxes)						
CCL/ Electricity tax	0.31	0.04	0.32	0.04	0.32	0.04
Average total charges (excl. VAT)	3.66	3.96	4.16	4.37	4.09	4.50

4.3 Conclusions on average network tariffs and charges

The conclusions from the assessment of network tariffs and charges across the entire customer base are as follows:

- o NI's underlying fundamental network charges are broadly similar to those in the two selected GB jurisdictions - on average, **over a three-year period**, they are on a par with WPD (South West) and below those of WPD (South Wales). NI's charges are significantly lower than RoI.
- o Among the possible reasons for the higher average charges in RoI compared with NI and GB, the most likely is that RoI has a lower population density than NI and much lower than GB, so the cost of serving these customers is likely to be higher.
- o Other charges that are collected by the network operators or elsewhere in the supply chain in NI do not significantly alter the general observation that average NI network and other charges are comparable to or below those of the two GB areas, and consistently below those in RoI.
- o The ROCs and CCL represent the most significant component of additional charges in NI. The electricity tax in RoI (which is the equivalent to the CCL) is negligible, while the PSO in that jurisdiction dominates other charges (the level of the PSO levy in turn is partly due to the cost of supporting renewable generation).
- o The equivalents to the SSS levy and some elements of the PSO charges are charged directly to the suppliers in GB (and are excluded from the present analysis), and to this extent the comparison between NI and GB does not accurately reflect differences in charges faced by end-users. In the case of RoI, the SSS levy is captured in network charges and PSOs are also levied at the network level, so the comparison is more like-for-like.
- o On a like-for-like basis, the analysis suggests that **NI's network charges inclusive of other related charges would be below those in both GB and RoI.**
- o Although pure network charges in NI are significantly below RoI tariffs, once other charges are added, the difference is considerably lower as the NI other charges are much larger in both absolute and proportionate terms.

5 Charging differences between customer categories

In the previous Section we considered the overall (i.e. for the total customer base) average network and related charges in the different jurisdictions. In this Section, we compare the relative network and other charges for selected customer categories and attempt to unravel the differences in charges to these different customer groups across the comparator jurisdictions, by focusing on differences in:

- o the levels of average costs in the jurisdictions,
- o the levels of 'other' charges, and
- o how the costs and charges are allocated to different customer categories.

5.1 Choice and matching of customer categories

For the purposes of comparing network and related charges across customer categories, detailed analysis was undertaken for 11 NI customer groups (and their corresponding categories in RoI and GB) representing almost 90 per cent of total MWh electricity sales. This sample covered residential, small and large I&C customers and unmetered supplies. However, in order to keep the analysis and presentation of results tractable, we focus on a smaller sub-set of categories in the present report. These still represent a sizeable two-thirds to four-fifths of total electricity consumption in the various jurisdictions. Specifically, the NI tariff categories considered are the following:

- o **T011**, which is the standard domestic rate covering the majority of residential customers
- o **T031**, which covers most of the small commercial/industrial customers
- o **T101**, which represents industrial, commercial and miscellaneous customers with demand above 70 kVA and below 1 MW.

These three categories represent the largest groups by MWh sales; the other tariff categories are relatively small in terms of percentage sales. Nevertheless, given concerns that large I&Cs may be paying relatively more compared to other tariff categories (as discussed in the introductory section of this report), we also include the following tariff categories in the comparative analysis:

- o **T202**, which includes large I&Cs with demand above 1 MW and who are connected to the high voltage (6.6/11 kV) distribution network
- o **T303**, which covers large I&C customers also with demand exceeding 1 MW, but who are connected to the extra-high voltage (33 kV) network and are located at some distance from the network (more than 150 metres).

Having identified the NI tariff categories that are the focus of the analysis, the next step is to map these to the equivalent categories in the respective jurisdictions for the purposes of

conducting the comparisons. The matching of tariff categories across NI, RoI and GB is shown in Table 7 below.

Table 7 Matching of the selected customer categories across jurisdictions

NI	RoI	GB
T011 Domestic Standard rate	DG1 Urban Domestic Standard Meter	100, 105, 800, 860 Domestic unrestricted
T031 Small commercial/industrial standard rate	DG5 LV Business – non-maximum demand (Standard Meter)	200, 810, 862 Small non-domestic unrestricted
T101 Industrial, Commercial and Miscellaneous (≥ 70 kVA & < 1 MW)	DG6 LV Business maximum demand day/night meter	300 LV HH metered
T202 Supplies taken at HV: Industrial, Commercial and Miscellaneous (≥ 1 MW, Minimum distance (0.01-0.15 km))	DG7 MV day/night meter	400 HV HH metered
T303 EHV Industrial, Commercial and Miscellaneous (≥ 1 MW, Minimum Distance (over 0.15 km))	DG7 MV day/night meter	400 HV HH metered

5.2 Revenue shares by customer group

By way of background and before examining the relative average costs (for both UoS tariffs and other charges) across customer categories, we show below the relative importance (in revenue terms) of the constituent charges in each jurisdiction by customer group. The information is presented for the 2012-13 tariff year and in the case of GB we only present information for South Wales. Finally, we note that in RoI and GB we group categories T202 and T303 together as the comparator tariffs are a single group in these jurisdictions (DG7 and 400 in RoI and GB, respectively).

As shown in the following three figures (Figure 13, Figure 14, Figure 15):

- o In NI and GB, (UoS and total) revenues from residential customers constitute a much larger proportion of the total compared with RoI
- o In NI, revenues from large I&Cs are a much smaller share of the total compared with both RoI and GB (with the exception of revenues from other charges, where the share is the same order of magnitude with RoI).

While these figures provide important contextual information regarding the relative weighting of the sources of the various elements of revenue and across customer groups, inter-jurisdictional comparisons require these to be considered together with consumption levels and at a unit charging level. We do this in the sections immediately following the pie charts.

Figure 13 UoS revenues – shares by customer group (2012/13)

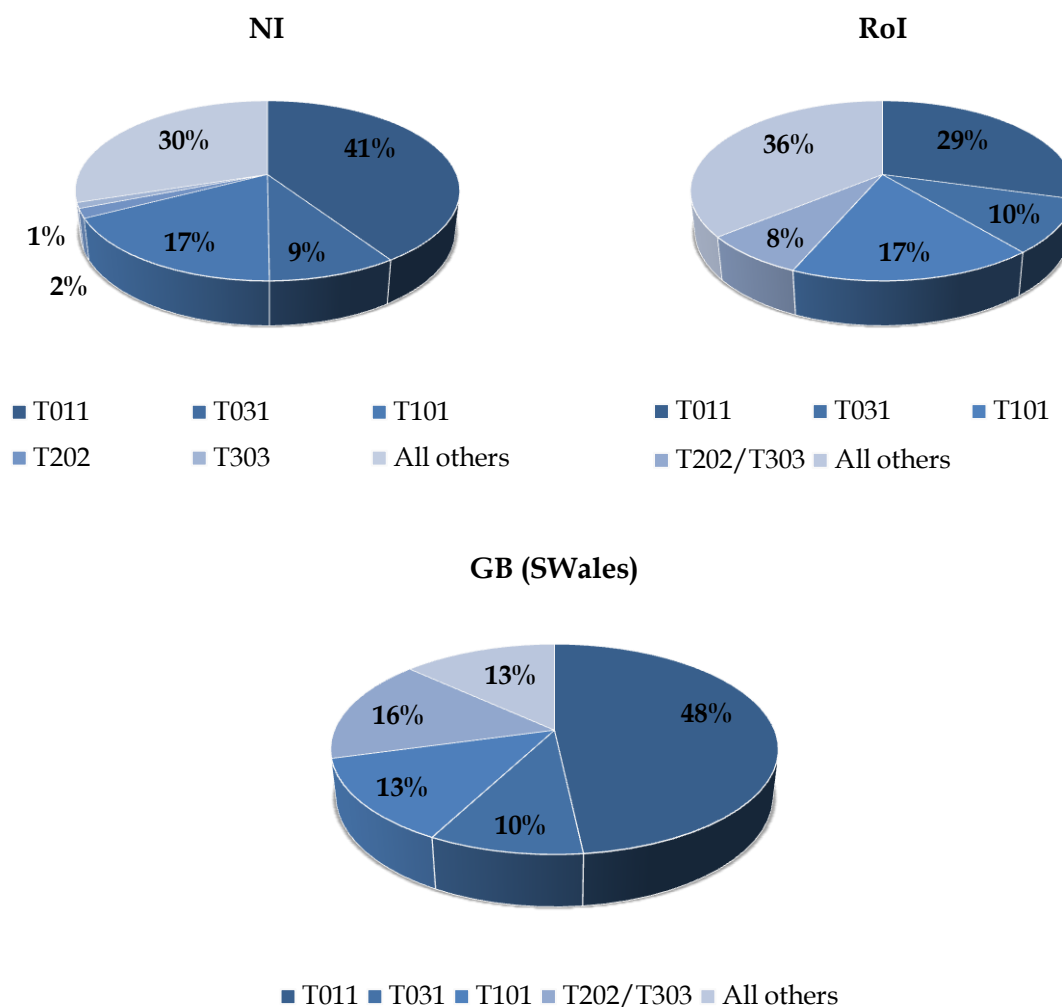
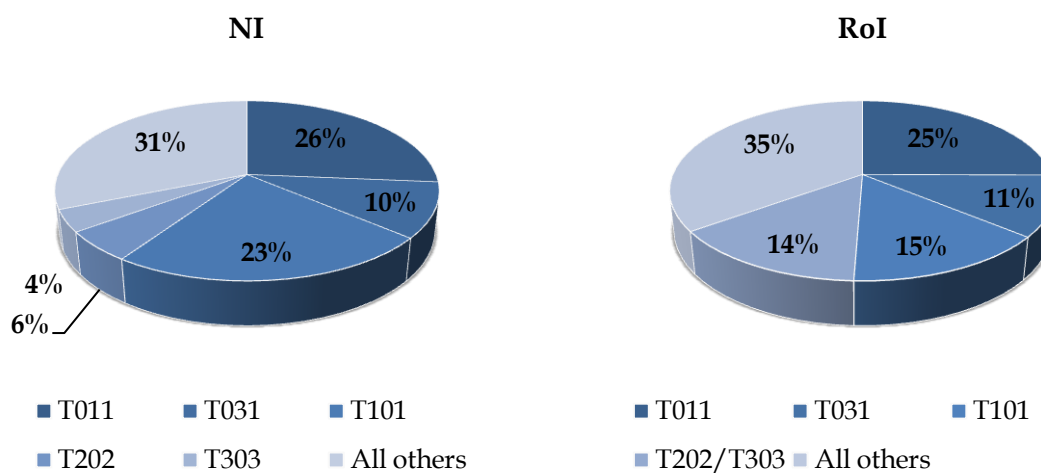


Figure 14 Revenues from 'other' charges – shares by customer group (2012/13)



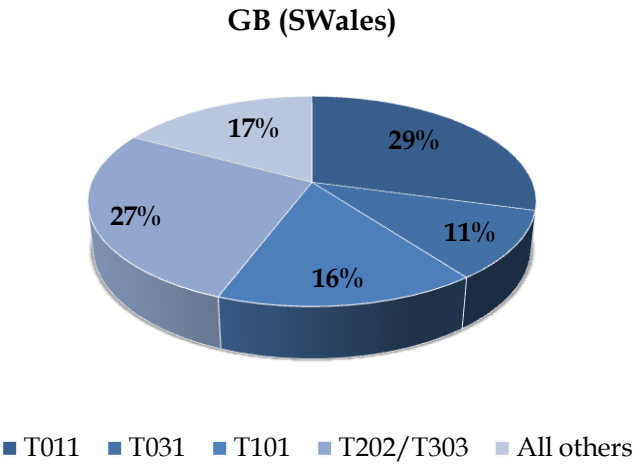
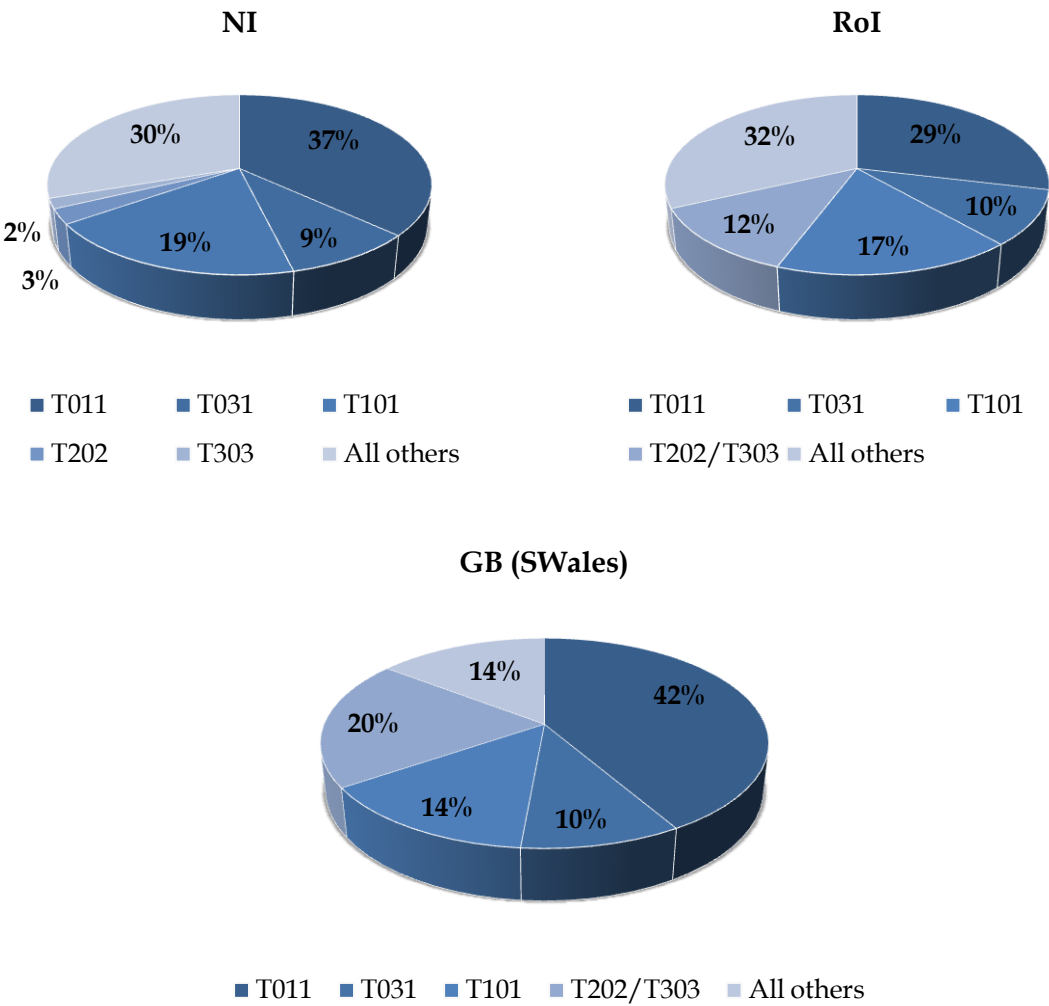


Figure 15 Revenues from network & other charges-shares by customer group (2012/13)



5.3 Network tariff structure characteristics

5.3.1 Why network tariff designs are relevant

The design of the network tariffs are relevant because they are the **primary mechanism by which costs are allocated to the different customer groups**. Suppose, for example, we compare two UoS tariffs, one with only a demand charge (£109.5 per kW of annual maximum demand) and another with an energy only charge (£25 per MWh). For a customer with an annual maximum demand of 100 kW and a 50% load factor, the two tariffs lead to identical annual UoS costs.²⁵

However, for an industrial customer with a high load factor (relatively constant demand through the day and year), the demand charge would lead to lower annual UoS costs while for residential customers (who generally have low load factors), it would lead to higher annual costs. This is one example of how the design of the tariffs impacts on the allocation of costs. Other design features, including the time-of-use pattern of charges, fixed charges, reactive power charges, etc., when combined with customer load patterns, all have impacts on the allocation of costs by customer.

5.3.2 NI compared with RoI

The key differences between the network tariffs in NI compared with RoI are that in NI the kWh charges for larger customers are differentiated by time-of-year whereas in RoI they are not. Apart from this, the tariff design structures are broadly similar:

- o Residential customers (T011 in NI and the simple kWh DG1 tariff in RoI) are charged a fixed or standing charge and a kWh charge that does not differentiate by time-of-use.
- o Small non-residential customers with demand below 70 kVA are also charged in both jurisdictions (T031 in NI and DG5 in RoI) on the basis of a fixed/standing charge and a simple kWh charge that does not differentiate by time-of-use. One relatively small difference is that RoI does include a charge for reactive power (per kVArh) for this group.
- o The larger industrial and commercial customers in RoI in category DG6 are charged per kVA of maximum import capacity plus kWh charges that differentiate between day time and night time (7-hour period). There is also a reactive power charge (per kVArh). In NI, the corresponding T101 tariff includes a monthly charge for each kVA of "Chargeable Service Capacity" recorded during daytime hours plus kWh charges that differentiate between peak, daytime, and off-peak hours within the day, and between seasons (three seasons). T101 also has a reactive power charge (per kVArh).

²⁵ The equivalence between the two charging mechanisms can be shown by solving for average annual load using the load factor equation, viz. average load = 50% x 100kW x 8,760 hrs. / 1,000 = 438 MWh. Multiplying this load by a £25 MWh unit charge yields £10,950 which is equal to £109.50 (demand charge) x 100kW (maximum demand).

Compared with RoI's tariffs, NI's tariff will tend to allocate more costs to the larger industrial and commercial customers whose load is concentrated more heavily in winter months. Or conversely, RoI's tariffs will tend to charge relatively less to industrial and commercial customers whose load is concentrated in winter months.

Although the tariff structures may be broadly similar between the jurisdictions, the relative levels of tariffs charged to the different groups may differ. This is investigated further below (Sections 5.4 to 5.7).

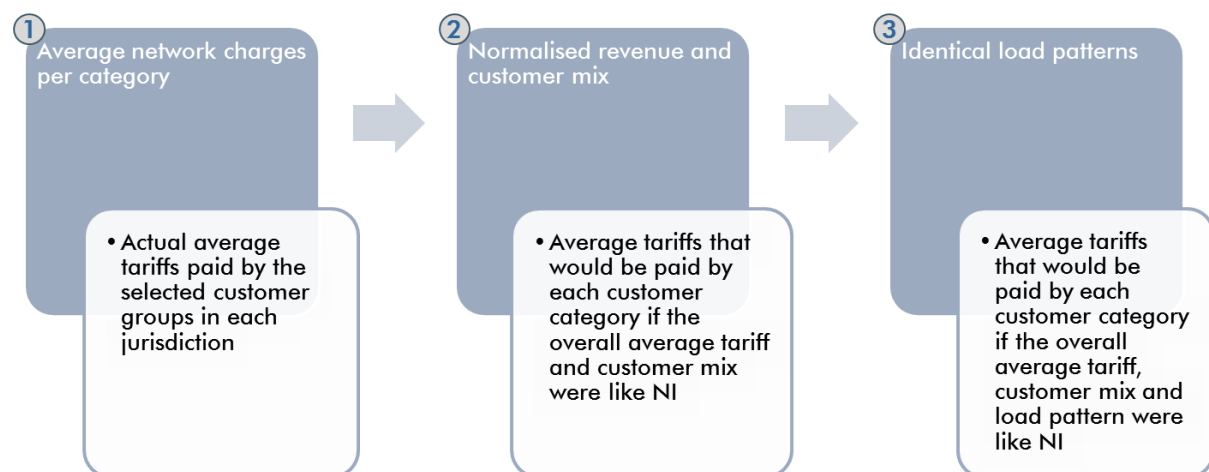
5.3.3 NI compared with GB

NI's use-of-system tariff designs are broadly similar to those of WPDs. WPD's tariffs have simple kWh charges for residential and small non-residential customers and demand charges plus time-of-day kWh charges for larger industrial and commercial customers, but with no seasonal differentiation as in NI.

5.4 Unravelling the differences in network tariffs

The approach to untangling the role of various parameters that result in differential tariffs by customer category is summarised in Figure 16 below.

Figure 16 Methodology for identifying the causes of network tariff differentials



The process can be described as follows (the numbering corresponds to the steps in Figure 16 above):

1. We begin by showing a comparison of charges to the selected groups of end-users. These correspond to the **actual average charges** that would be paid by each category in the individual jurisdictions (subject to corrections for outturn

consumption). The reasons for the differences between jurisdictions at this level are multiple, including differences in:

- the overall average levels of tariffs resulting from different overall allowed revenues as described in the analysis in Section 4
 - the mix of customers between jurisdictions
 - the tariff designs employed and the subsequent cost allocation resulting from the tariff structure
 - load patterns of individual customer groups across jurisdictions.
2. Given the above factors, we next remove underlying differences between jurisdictions in average tariff levels, by **normalising for NI average revenues and customer mix** (see Annex A1 for a description of the normalisation process). In this analysis, the overall average tariff levels across all customers²⁶ are adjusted so that they give identical averages in the different jurisdictions. Additionally, because the customer mix influences the average tariff, we adjust the customer mix so that all four comparators have a similar mix of customers.

Practically, this entails normalising charges to the NI average tariff (for ‘all’ customers) and the NI customer mix. This enables us to separately identify the cost differences attributable to the total average network tariff levels and the costs attributable to the allocation mechanism (or tariff design). For example, NI’s overall tariffs might be 10 per cent below RoI’s tariffs, but NI’s tariffs for large I&C customers might only be 5 per cent below RoI’s – in order to separately **understand the contribution of overall average levels relative to the contribution of the cost allocation mechanism**, we first bring all charges in RoI down to a level that matches NI’s average revenues. As mentioned above, the majority of NI’s electricity consumers (11 tariff categories) are included in the broader analysis, but not all. Hence, it is important to note that when considering the redesign of tariffs and the reallocation of charges, and when normalising for average revenues in NI, we are focusing on, and normalising for, this sub-set of consumers.

As mentioned above, it is also important to normalise for customer mix because this influences the average tariff level. To take an extreme example, a jurisdiction with 100 per cent large industrial customers would have a lower average tariff than one with 100 per cent residential customers. To normalise for this, we assume that all four jurisdictions have the same customer mix as NI.

3. In a final step, we remove all differences between jurisdictions other than the tariff design. In this analysis, we use the same average revenues and the same customer mix (as in step 2), but also **the same load patterns** in RoI and GB as for NI. This therefore shows purely the differences in revenue allocation caused by tariff design. Put differently, this answers the question, how much would a baker from NI pay if he or she moves to Cardiff or Dublin, or alternatively how

²⁶ More correctly, across the sample of the 11 NI customer categories and their equivalents in the other jurisdictions.

much the baker would pay if he or she remained in NI but paid for electricity on the basis of the RoI or GB tariffs.

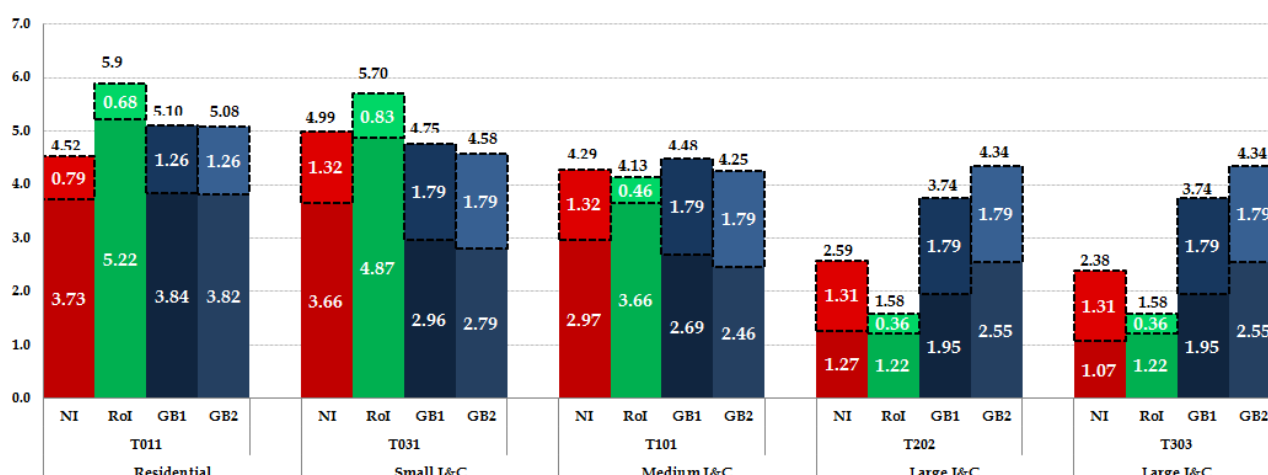
In practice, we found that step 3 did not materially alter the results from step 2 and we therefore do not report on these results below. This was not surprising as electricity consumption behaviour for the same customer types in the different jurisdictions under consideration does not differ noticeably. Moreover, the customer load patterns we employ rely on typical customer load profiles (provided by NIE), which in turn are derived from GB profile classes, although these are adjusted for NI sunrise and sunset times and average temperatures compared with GB reference weather stations.

5.5 Comparative average charges per customer category

The total charges per customer category in the different jurisdictions are shown in Figure 17. Core network UoS charges are shown in the bottom segment of the bars and the other charges appear in lighter shades and within a broken line border at the top of the bars. The sum of the network and other related charges appears above the bars. Broadly, this graph shows that all-inclusive charges are higher in NI for some customer categories, lower for certain others and about the same for others. Key observations that can be made are as follows:

- o Compared to GB, core UoS tariffs are lower in NI for customers at opposite ends of the size spectrum (i.e. residential customers on the one hand and the large I&Cs on the T202 and T303 tariffs on the other) but they are higher for small (T031) and medium to large (T101) sized I&C customers.
- o Relative to RoI, pure network charges for all but the larger I&C customers are significantly lower in NI. However, for the large I&Cs (T202 and T303), average network charges are broadly comparable (slightly higher in NI for the former and somewhat lower for the latter).
- o When all-inclusive charges are compared, NI charges for residential consumers and the large I&Cs continue to be significantly lower relative to GB, but are now broadly comparable or slightly higher for tariff categories T031 and T101.
- o Compared with RoI, the all-inclusive charges for all large I&C customers (including T101) are now higher (and significantly so for the T202 and T303 categories), but they remain lower for the T011 and T031 tariff codes, albeit with a lower differential.
- o The average UoS tariffs in GB display a flatter profile (i.e. less variation between customer groups) compared to both NI and RoI and particularly in relation to the latter where charges for the largest I&Cs are considerably lower relative to the other tariff categories being compared.
- o The 'other' charges in RoI are significantly lower than both NI and GB, and generally decrease with customer size. By contrast, in both NI and GB other levies and charges are generally higher for the larger customers and form a significant component of the total charges paid by these customers.

Figure 17 Total network and other charges by customer category (p/kWh, 2012/13)



We further explore the last two points above by respectively presenting additional data in Table 8 and Table 9 below.

First, we examine the relativities between the core UoS tariffs paid in the respective jurisdictions by the relevant customer categories. For this purpose, we create an index which sets the residential tariff to 100 for each jurisdiction and expresses the average charges for all other customer categories in relation to the residential index for that jurisdiction. Hence, for example, in the case of the T031 category in NI, and as shown in Table 8, the tariff is only slightly lower than the residential tariff, which contrasts with GB where it is about three-quarters of the average retail UoS tariff.

Table 8 Inter-customer group network UoS tariff relativities (2012/13)

Tariff category	NI	RoI	WPD (SWales)	WPD (SWest)
T011	100.0	100.0	100.0	100.0
T031	98.2	93.2	77.3	73.2
T101	79.5	70.2	70.2	64.5
T202	34.1	23.5	50.9	66.9
T303	28.7	23.5	50.9	66.9

Table 8 confirms the earlier comment regarding the relativities between the average tariffs for the various tariff categories. In NI and RoI, small (T031) and (to a lesser degree) medium-sized (T101) I&C customers pay relatively higher UoS tariffs, but larger customers have significantly lower tariffs. In RoI, for example, T303-equivalent customers pay less than a quarter of the residential tariff as compared to WPD's South West customers on the equivalent tariff who pay two-thirds of the residential tariff in that jurisdiction. Because of these differences, **the tariff range between the largest and smaller customer groups is much wider in NI and RoI**, which would seem to suggest that the tariff design in these jurisdictions allocates relatively fewer network costs to larger customers.

The dispersion between the relevant charges paid by the relevant customer categories is further exacerbated (at least in RoI) by the **differential allocation of the additional levies and costs**. This is shown in Table 9 below, which demonstrates that:

- o The absolute level of 'other' charges are much higher in NI and GB compared to RoI, and higher amounts are imposed on medium and larger sized customers in NI and GB, whereas the opposite is true in RoI; that is, the average of other charges for large I&Cs are lower than those imposed on residential customers and smaller I&Cs.
- o In proportionate terms, other charges represent a much higher proportion of the total prices paid by consumers in NI and GB, particularly for the larger customers – the charges in NI, for example, more than double the network UoS charges for the T202 and T303 categories, but add less than a third to the equivalent tariffs in RoI.

Table 9 Uplift to network UoS tariff from other charges (2012/13)

Tariff category	NI		RoI		WPD (SWales)		WPD (SWest)	
	%age of UoS tariff	Amount p/kWh	%age of UoS tariff	Amount p/kWh	%age of UoS tariff	Amount p/kWh	%age of UoS tariff	Amount p/kWh
T011	21.2%	0.79	13.0%	0.68	32.8%	1.26	33.0%	1.26
T031	36.1%	1.32	17.1%	0.83	60.4%	1.79	64.0%	1.79
T101	44.6%	1.32	12.7%	0.46	66.4%	1.79	72.7%	1.79
T202	103.4%	1.31	29.1%	0.36	91.7%	1.79	70.1%	1.79
T303	122.3%	1.31	29.1%	0.36	91.7%	1.79	70.1%	1.79

5.6 Adjusting for differences in network costs

We now consider differences between the jurisdictions due purely to different tariff designs (and load patterns, which in turn are an important determinant of the allocation of costs by customer category). In order to do this, we assume that all jurisdictions face the same average revenue per kWh as NI, that is, we normalise charges in the four areas in order to remove the influence of differences in overall average tariff levels as well as variances in customer mix (in MWh sales). Differences between the jurisdictions are then purely **due to tariff design and load patterns**. In practice, because consumers in the various jurisdictions face very similar weather and economic conditions and parallel working hours, load profiles in the different jurisdictions are generally similar, so this does not significantly alter the results reported here.

For this analysis, we exclude non-core network charges (levies, etc.) which are simple add-ons to the kWh charges. The results of the analysis are shown in Figure 18.

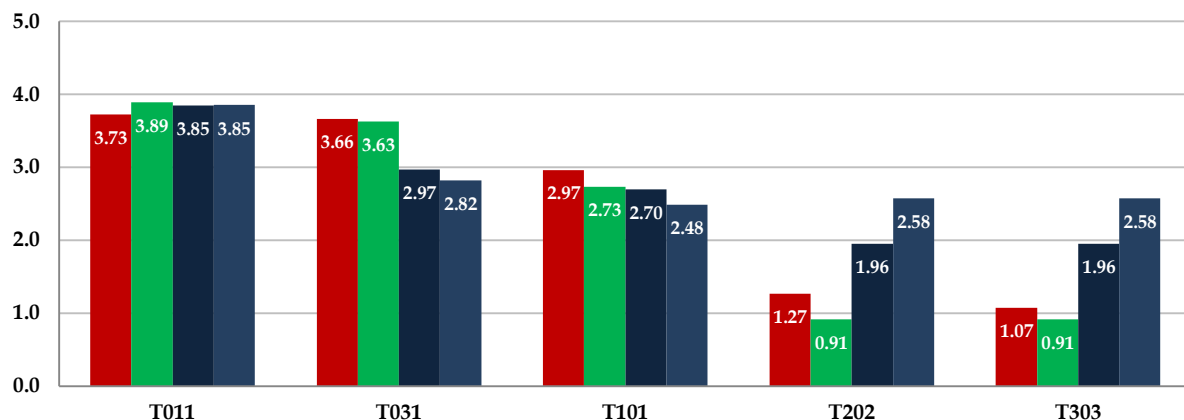
Figure 18 Network tariffs normalised for average revenue (p/kWh, 2012/13)


Figure 18 generally shows less variation between NI, GB and RoI than Figure 17 previously. The base tariffs in NI shown in Figure 18 remain the same as in Figure 17. The base tariffs in GB and RoI change for two reasons: firstly because of the normalisation of tariffs for NI revenues and secondly because of the normalisation for NI customer mix. Because NI has a considerably higher share of residential sales than RoI, and because residential tariffs tend to be higher than non-residential, the tariff levels in RoI are adjusted more substantially (downwards) in order to achieve the same average revenue per kWh as NI.

As shown in the graph, **residential charges (T011) in NI**, when the other jurisdictions are normalised for NI average revenues and customer mix, **are broadly similar to but below** those of RoI and the two GB networks.

NI's basic charges for the other two relatively large tariff categories – T031 and T101 – after normalisation are also still considerably **higher** than those of GB and are now higher also than those of RoI; and customers in the **T202 and T303 category** in NI are paying **lower** charges than their counterparts in GB, but **higher** than those in RoI. With the add-on charges, the differences between NI and RoI tariffs would be larger still for I&C customers, especially the larger ones. As before, the analysis suggests that relatively fewer costs are allocated to large I&C customers in RoI compared to both NI and GB. This is not to say that the tariff designs and associated cost allocations are not correct – as indicated at the beginning of this report, the analysis only examines **how** the tariff designs contribute to differences in tariff levels charged to different customer groups and does not investigate the normative question of what the tariff designs ought to be given the system, cost and load characteristics of the respective networks.

5.7 Relative contributions of tariff levels and design

In this final sub-section we bring together the analysis in the previous two figures to demonstrate the relative contribution of differences in tariff levels and tariff design to the differential tariffs between customer categories. For reasons of brevity, we only show the graphs for NI and RoI, but do report on the NI and GB comparison further below.

The resulting analysis for NI/RoI is presented in Figure 19 in the form of ‘waterfall’ graphs for each of the five customer groups forming the focus of the study. The charts can be interpreted as follows:

- o The bars at either side are the average of the total network and other charges for NI and RoI respectively and for the relevant customer group. The blocks in between show the relevant contribution of the overall network tariff level, the network tariff design, the level of ‘other’ charges and their allocation across customers in explaining the difference.
- o The first block represents the amount that the NI tariff needs to be **scaled up** to bring it into equivalent revenue terms with RoI given differences in allowed revenues and the customer mix. Put differently, if the tariff designs (and load patterns) were equivalent in the two jurisdictions and only allowed revenues and the customer mix differed, the resulting tariff should be equal to this block added to the NI tariff (or, equivalently, this block subtracted from the RoI tariff). That they are not equal is due to differences in tariff design.
- o The latter is represented by the second block in the ‘waterfall’ and can be either **positive or negative**, depending on the customer group. A positive number implies that the RoI tariff design allocates relatively more costs to that particular customer group, while a negative number means that relatively fewer costs are allocated to the relevant group.
- o The third block represents the amount that total NI charges need to be **scaled down** to bring them into equivalent revenue terms with RoI given that the overall absolute level of these charges is lower in RoI compared with NI.
- o The fourth and final block demonstrates the adjustment that arises from the differential allocation of the other charges to the different customer categories and can be either **positive or negative**, depending on the customer group. A positive number implies that RoI allocates a greater proportion of a given level of other charges to that particular customer group, while a negative number means that a relatively smaller proportion of other charges are allocated to the relevant group.

The interpretation of the graph is perhaps best illustrated with the use of an example. Hence, taking T011 as an example, the actual tariff in NI is 4.52 p/kWh and that in RoI is 5.90 p/kWh. RoI’s higher cost of 1.38 p/kWh can be ‘explained’ as:

- o +1.32 p/kWh **higher** because network costs in RoI are higher on average for all customers
- o +0.16p/kWh **higher** because RoI allocates relatively more core costs to T011 customers
- o -0.39p/kWh **lower** because RoI’s ‘other’ charges are lower than NI on average
- o +0.28p/kWh **higher** because RoI allocates more of the ‘other’ charges to T011.

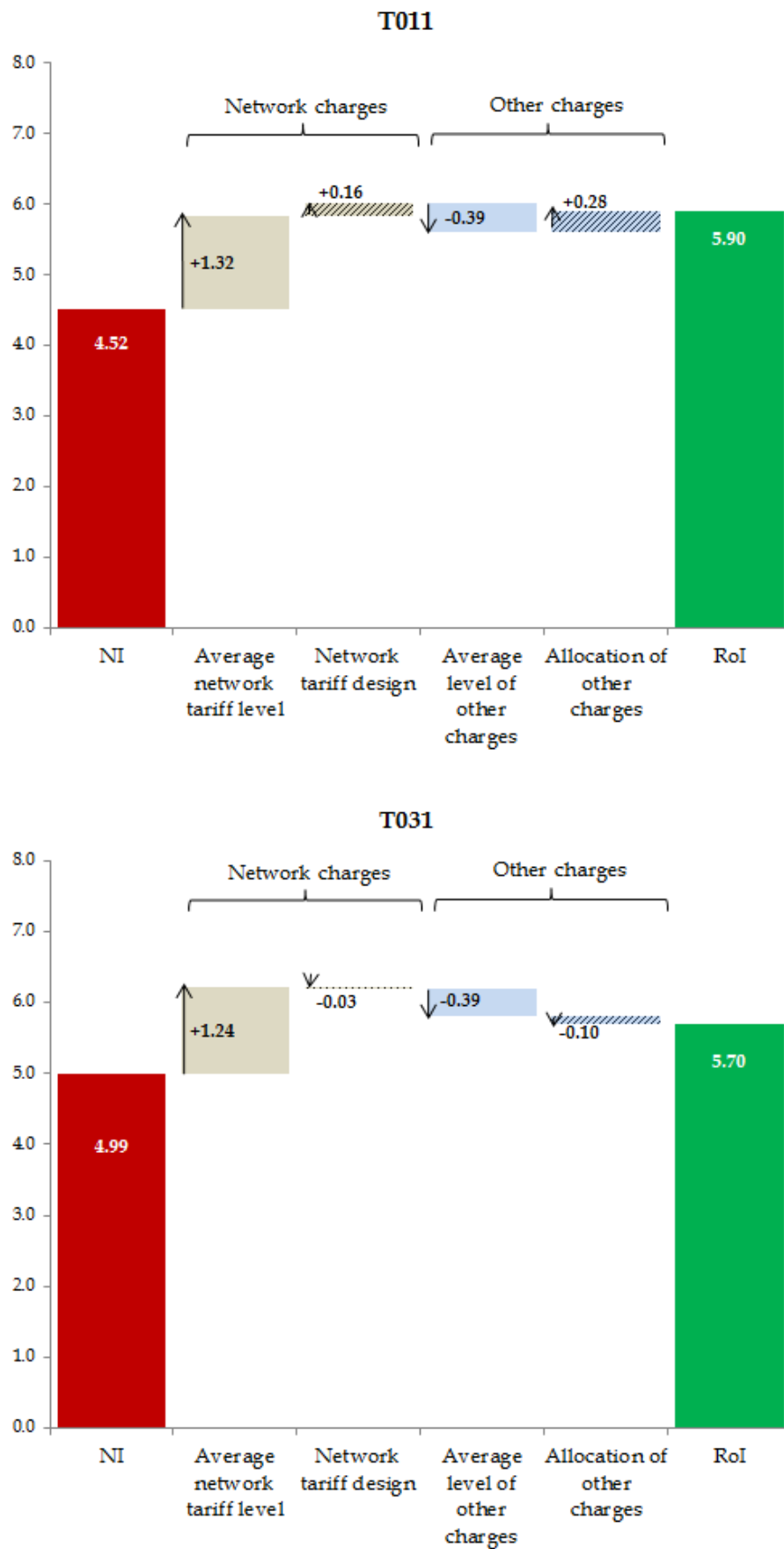
The differentials for the other tariff categories are similarly deconstructed in Figure 19.

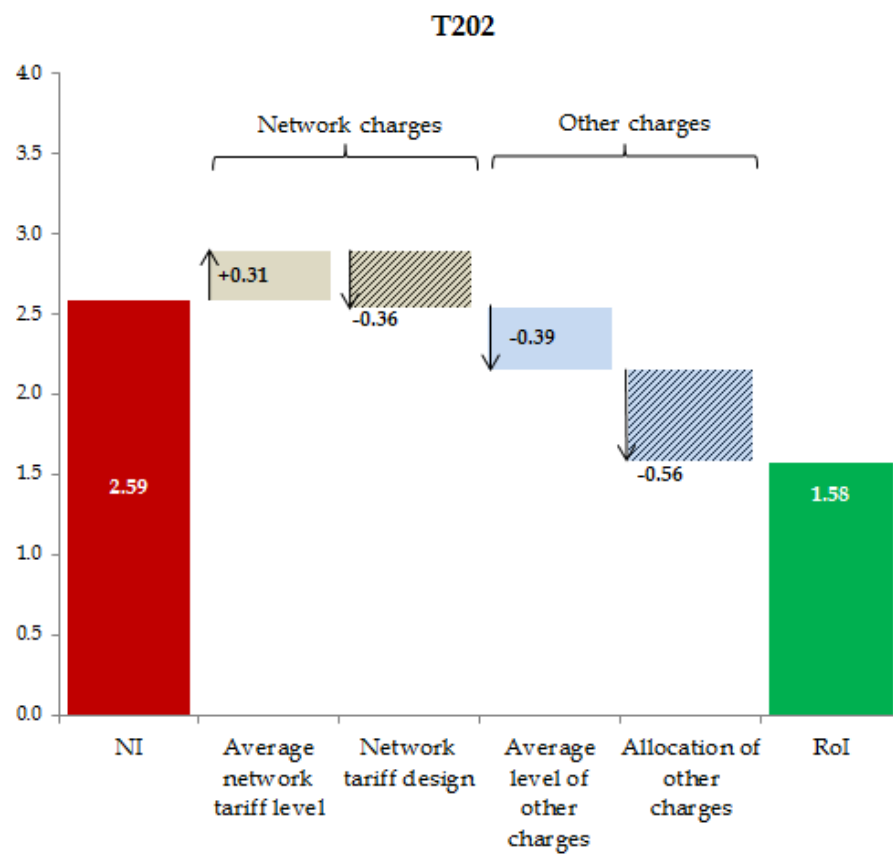
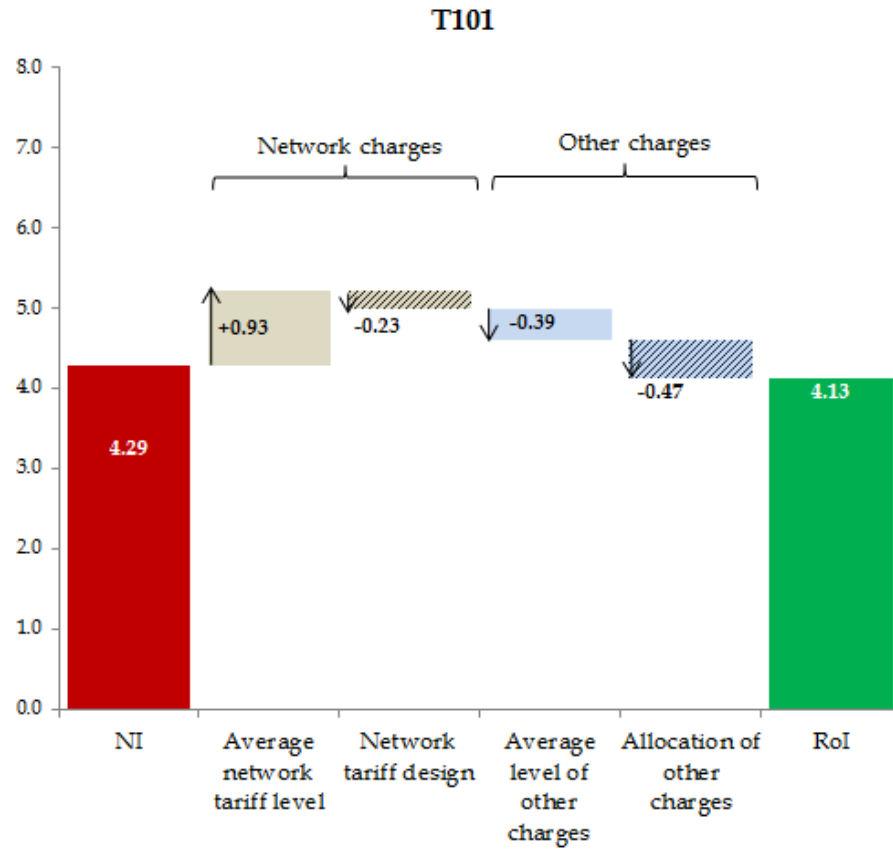
The negative 'allocation' blocks in Figure 19 must balance the positive 'allocation' blocks. For example, the +0.16 p/kWh higher charge for T011 equivalent customers in RoI must be balanced by lower charges to other customers such as T101, T202 and T303. Because residential sales are a large part of total MWh sales in NI, it is possible for a relatively small +0.16 p/kWh for T011 customers to balance the -0.23 p/kWh, -0.36 p/kWh and -0.16 p/kWh for T101, T202 and T303 customers shown in Figure 19.

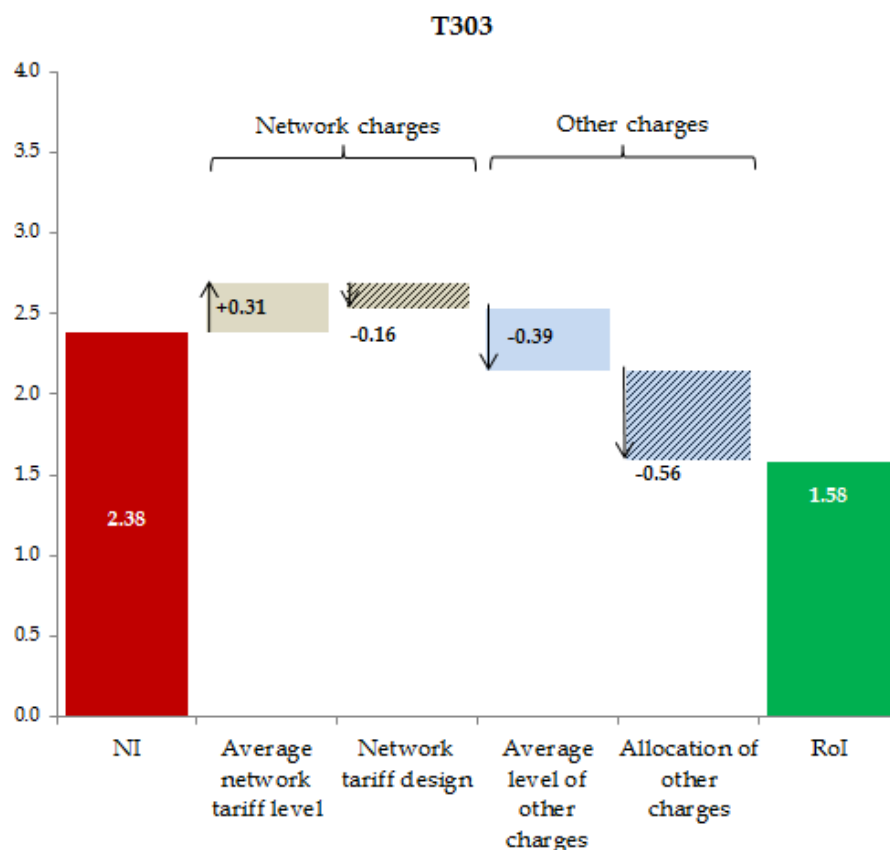
Overall, Figure 19 indicates that:

- o Tariffs in NI for each customer group would be expected to be lower than the RoI equivalents given the higher overall allowed revenues in that jurisdiction
- o The difference between NI and RoI for customer category T031 (small I&C customers) is largely explained by the difference in the overall tariff level
- o The residential tariff is higher in RoI than average revenue differences would explain and therefore the tariff design results in relatively higher domestic tariffs in RoI
- o Correspondingly, the tariffs for the medium and large I&Cs are lower than would be explained by overall average revenue differences alone and, therefore, the tariff design in RoI leads to relatively lower tariffs for these customers
- o Given 'other' charges are lower in RoI compared with NI, these would (other things equal) result in lower overall charges in RoI. However, this effect is somewhat countervailed in the case of residential customers (as the other charges are allocated more heavily on smaller customers in RoI compared with NI), but is further exacerbated for the large I&Cs for the same reason.

Figure 19 Influence of tariff levels & design on NI-RoI differentials (p/kWh, 2012/13)







Below we present similar information for the NI-GB comparison but in tabular format. To keep the analysis simple, we present information only for the South Wales distribution area. As before, at either end we show the average tariffs for the five customer categories in each of the jurisdictions and the columns between the two show how the network tariff level; tariff design, the level of add-on charges and the allocation of the latter contribute to the observed charging differences. The picture that emerges is very different from the NI-RoI comparison above. Specifically, the table demonstrates that:

- o The overall network tariff levels (as discussed previously) are comparable between the two jurisdictions and therefore these contribute nothing or only a negligible amount to the difference in total network and other charges for all customer categories
- o There are nevertheless differences in tariff design, with NI allocating fewer costs to the T031 and T101 categories but more to residential customers and the larger I&Cs, particularly the latter
- o The 'other charges' in GB are higher (especially due to ROCs) so these serve to raise GB charges relative to NI
- o Interestingly, however, the allocation of the other charges is broadly similar with NI so the allocation mechanism of the add-ons does not contribute to the differences in charges between customer groups in the respective jurisdictions.

Table 10 Build-up of the cost differences (NI-GB) (p/kWh, 2012/13)

Tariff code	NI average charge (UoS + 'other')	Difference due to:				GB (SWales) average charge (UoS + 'other')
		Average network tariff level	Network tariff design	Average level of other charges	Allocation of other charges	
T011	4.52	-0.01	0.12	0.46	0.00	5.10
T031	4.99	-0.01	-0.69	0.46	0.00	4.75
T101	4.29	-0.01	-0.27	0.46	0.00	4.48
T202	2.59	0.00	0.69	0.46	0.01	3.74
T303	2.38	0.00	0.88	0.46	0.02	3.74

5.8 Conclusions on customer category comparisons

The broad conclusions arising from the assessment of network tariffs and other charges between the selected customer categories and jurisdictions can be summarised as follows:

- o NI's core network charges for the five customer categories examined (before normalising for differences in allowed revenues, etc.) are much lower than RoI, with the exception of the very large I&C customers where charges are broadly comparable. Compared to GB, they are lower for residential and large I&C customers, but higher for intermediate customer categories.
- o When all-inclusive charges are compared (that is, the levies and other charges are included with UoS tariffs), **all large I&C customers in NI pay more than the equivalent categories in RoI**, whereas residential and small I&C consumers pay less, albeit with a lower differential. Compared to GB, NI charges for residential consumers and the large I&C customers are significantly lower, but are broadly comparable or slightly higher for tariff categories T031 and T101.
- o The tariff range between the largest and smaller customer groups is much wider in NI and RoI (particularly in the case of the latter) compared to GB, which would seem to suggest that the tariff design in these jurisdictions allocates relatively fewer network costs to larger customers.
- o The dispersion between the relevant charges paid by the relevant customer categories is further exacerbated in RoI by the differential allocation of the additional levies and costs - **the 'other' charges in RoI are significantly lower than both NI and GB, and generally decrease with customer size**. By contrast, in both NI and GB other levies and charges are generally higher for the larger customers and therefore have a much higher weighting (in some cases the highest) in the total charges paid by these customers.
- o Simply comparing average network charges for the different customer categories between the jurisdictions makes it difficult to isolate the impact of overall

underlying differences in the overall revenue that must be recovered from customers compared to the influence of different tariff designs (which allocate a given allowed revenue to customer groups). It is helpful therefore to normalise for revenue and customer mix differences to examine the differential between the customer groups and jurisdictions caused solely by the variant tariff designs (and load patterns).

- o Residential charges (T011) in NI, when the other jurisdictions are normalised for NI average revenues and customer mix, are broadly similar to but below those of RoI and the two GB networks. NI's basic charges for the other two relatively large tariff categories – T031 and T101 – after normalisation are considerably higher than those of GB and also higher than those of RoI; and customers in the T202 and T303 category in NI pay lower charges than their counterparts in GB, but higher than those in RoI. With the other charges added onto the normalised tariffs, the differences between NI and RoI tariffs would be larger still for I&C customers, especially the larger ones.
- o Overall, the analysis suggests that **relatively fewer costs are allocated (through the tariff design) to large I&C customers in RoI** compared to NI, which in turn allocates fewer costs to these customers compared with GB. Because RoI has lower 'other' charges and also allocates relatively smaller proportions to its larger customers, the differential between RoI and NI/GB widens further for these customers when all-inclusive charges are compared.

6 Conclusions

The present study was motivated by a need to understand the degree to which differences in end-user electricity prices between comparable jurisdictions to NI identified in previous UR analysis could be explained by network and other ‘pass-through’ charges. It also began on an untested premise that overall core network tariff levels are not a significant contributing factor to such differences; rather, it was believed that observed variances could be due to the level and allocation of non-network charges, as well as the allocation of network costs across customer categories. This study has generally confirmed these suppositions.

The first part of the analysis examined the total allowed network revenues per kWh (across all customer groups) and the components of both pure network tariffs and ‘other’ charges that could account for any differences. This revealed that NI’s underlying fundamental network charges are broadly similar to those in the two selected GB jurisdictions and significantly below those in RoI. In fact, on a like-for-like basis (i.e. after taking into account certain charges that are incorporated in the NI figures but which are not fully captured in the GB data, although are ultimately paid by customers there), the analysis suggests that **NI’s network charges inclusive of other related charges would be below those in both GB and RoI**. While pure network charges in NI are significantly below RoI tariffs, once other charges are added, the difference is considerably lower as the NI other charges are much larger in both absolute and proportionate terms compared to RoI.

Given these findings, any observed differences between what particular customer groups in NI pay relative to RoI and GB could only be explained by the allocation of the average allowed tariff/revenues and/or additional charges **between** customers. This formed the subject of the second part of the analysis, where we focused on the three largest customer groups in NI (by MWh sales), namely the residential (T011), small I&C (T031) and medium to large I&C (T101) customers and their equivalent groups in RoI and GB, plus two larger I&C tariff categories (T202 and T303) given concerns that the larger I&Cs may be paying relatively more in NI compared to other tariff categories.

For the purposes of the second part of the analysis, tariffs and charges were compared from different perspectives – i.e. in terms of what the customer groups actually pay, by examining what they would pay if the overall average tariff and customer mix in the comparator jurisdictions were like those in NI, by assessing inter-customer group network UoS tariff relativities and exploring the ‘burden’ of other add-on charges on customer UoS tariffs, etc. The broad conclusion of this analysis (which confirms the initial inference) is that **relatively fewer costs are allocated (through the tariff design) to large I&C customers in RoI** compared to NI (which in turn allocates fewer costs to these customers compared with GB). Moreover, because RoI has lower ‘other’ charges and also allocates relatively smaller proportions to its larger customers, **the differential between RoI and NI/GB widens further for these customers when all-inclusive charges are compared**.

As we have emphasised in the report, the analysis only examines how the tariff designs contribute to differences in tariff levels charged to different customer groups. This provides evidence on the differences between jurisdictions and the build-up of those differences. It does not investigate what the tariff designs ought to be given the system, cost and load characteristics of the respective networks. Additionally, although the report highlights differences in the allocation of other charges, we do not explore the merits of alternative allocation mechanisms for such levies and costs between customer types. Nevertheless, by

highlighting the important differences between NI and other jurisdictions the analysis may be helpful to policy makers and regulators in identifying possible policy or regulatory 'handles' that could be used to help with disparities in tariffs that customers face in the different jurisdictions, particularly between NI and RoI:

- o Average core network costs in NI do not appear to be a problem. Moreover, these have been addressed in detail by the recent Competition Commission inquiry and decision and core network charges are not therefore amenable to further major regulatory/policy revisions.
- o The average levels of non-core charges in NI are lower than those of GB but substantially above those of RoI. These charges in NI are, in some cases, legacy costs that cannot be easily avoided. Others are based on policies determined by central Government. These could potentially involve extensive discussion before they are revised for NI.
- o The allocation of core network costs among customer categories has a significant impact on some end-users. Tariff design is a regulatory issue that could be addressed by UR. Tariff design could be used to implement energy policies – but this is beyond the scope of this study.
- o The allocation of non-core costs among customer groups has significant impacts on some customer groups. This is potentially a fruitful area to be investigated for policy and regulatory interventions.

A1 Explanation of normalisation

A 'normalisation' procedure allows cost differences between any two or more items to be decomposed into their underlying causes. It can be applied to any two or more products that have different characteristics and different prices.

To take an example of two cars, one German with air conditioning and leather seats and an otherwise similar car made in France but without air conditioning and with conventional fabric seats. The German car is more expensive both because it has a reputation for reliability and because of the air conditioning and leather seats. The price differences can be decomposed into its components (air conditioning/leather seats and reliability) by 'normalising' for the costs of air conditioning and leather seats. This can be done either by asking how much the German car would cost without air conditioning and leather seats or asking how much the French car would cost with them. If we make the (very) simplifying assumption that there are no other differences, then any remaining difference in price between the two cars can be attributed to the cost or value of reliability, and a decision to buy can be made on the basis of the value of reliability (and the value leather seats and air conditioning).

The differences in network charges between the three jurisdictions in NI, RoI and GB have been decomposed in a similar way:

- o In the first step, we describe the total network charges in the three jurisdictions, reflecting all of the cost components reflecting differences in underlying network costs, differences in the add-on charges and differences in the way that charges are allocated to different customer groups.
- o For various legitimate reasons, there are underlying differences in average network costs in the three jurisdictions. For example, the population density in RoI is much lower than NI and GB and therefore, all-else-being-equal, average costs would be expected to be higher in RoI. If we want to decompose the various drivers of the cost difference, we have to first strip out this affect. So our second step is to 'normalise' for average costs by assuming that NI, RoI and GB all have similar average costs per kWh (we normalise to the average costs in NI). The remaining cost differences between jurisdictions are then the result of either the add-on charges or they result from the way that network charges are allocated to customers, or both.
- o The third step, then takes this one stage further, and asks what happens if the extra charges are identical across the jurisdictions. The remaining difference is then attributed to the way that charges are allocated.
- o Working backwards we can then calculate the contribution of cost differences in each jurisdiction that are caused by tariff design (cost allocation to customer groups), add-ons, and underlying network costs.