



## INQUIRY INTO THE RENEWABLE HEAT INCENTIVE SCHEME

DATE: 7 November 2018

---

**Closing Statement of: Mark Cockburn**

---

I, **Mark Andrew Cockburn**, Director of Cambridge Economic Policy Associates Limited (CEPA), will say as follows: -

*We thank the Inquiry for this opportunity to make a closing statement. Throughout our participation in the RHI Inquiry, CEPA has sought at all times to be a helpful witness. In particular, CEPA has sought to explain aspects of both the Northern Ireland (NI) and Great Britain (GB) renewable heat incentive (RHI) schemes in a technical level of detail that has gone beyond the scope of CEPA's direct involvement in the development of the RHI for NI. Throughout the course of the Inquiry, CEPA has undertaken a substantial disclosure exercise, provided four separate detailed witness statements, prepared accompanying analysis reports, and has presented live evidence in Belfast. CEPA's level of engagement has been very costly, both directly and in terms of resources being diverted away from CEPA's core business.*

*Indeed, in its apparent absence of dedicated independent third party economic and data analysis, we note that it is often numbers compiled by CEPA that have been used by the Inquiry and other witnesses to illustrate key points, such as the fact that a relatively small (10%) share of NI RHI beneficiaries accounted for over 40% of the scheme spend [TRA16382]. We would reiterate that it is simply not possible to put the NI RHI into context, both in absolute terms (such as in the case of its budgetary impact) and relative to the GB RHI, without such analysis. We would argue that both an absence of robust data analysis of the impacts of the scheme and a lack of understanding of key terminology such as what constitutes a "cost control" in the context of RHI, has led to wide-spread and persistent misunderstanding of the NI RHI.*

*We report this to the Inquiry with the hope of some recognition that CEPA has endeavoured to be of assistance and has gone beyond its core obligations as a witness to assist you in understanding many of the economic issues with which the Inquiry is engaged. The remainder of this closing statement is provided in similar vein in terms of drawing to the Inquiry's attention technical points or their implications that we believe have been missed or misinterpreted. We are, though, pleased to observe Dr MacLean's role in clarifying the intended role of tiering to mitigate a perverse incentive to "burn to earn" and a means of reducing returns, rather than as a means of cost control [TRA-10660].*



*More widely, we also recognise the comprehensive work that the Inquiry has undertaken in order to get to the bottom of some of the other hitherto lesser known contributors to the NI RHI's problems, which have only come to our attention given the Inquiry's forensic work. CEPA's present understanding of many of the factual circumstances is substantially more advanced than it was when CEPA was first called before the NI Public Accounts Committee in 2016. For that, and for hearing our evidence, we thank the Inquiry.*

*For the most part we agree with many of the observations made by the Inquiry's Panel throughout the course of the Inquiry hearings; however, there are a few instances, relating primarily to the interpretation of economic factors, where we believe the Inquiry might be assisted by our minimal further submissions. In particular, where we have identified disproportionate over or under-emphasis on particular aspects of the scheme, or where we think the degree of hindsight brought to bear on issues does not reflect the extent of the information available to those making decisions at the time, we provide our minimal further submission.*

*We have also sought to bring to the attention of the Inquiry some other observations which it may or may not be aware of but which we think are important to understanding what happened in the cases of both NI and GB RHI schemes. This essentially builds on CEPA's earlier evidence taking into account the emerging evidence presented to the Inquiry's Panel.*

*For purposes of this closing statement we therefore confine ourselves to these points. We do, of course, reserve the right to respond to any points that the Inquiry may make in writing to us, including any such draft findings presented to us, and with which we consider further clarification to be necessary.*

### **Importance of the renewables policy objective and the role of returns as an incentive for uptake**

*In understanding both design considerations as well as how both the GB and NI schemes were developed and operated, we believe that there has been an over-emphasis on scheme returns and a corresponding under-recognition of the role of the over-riding policy objective of meeting the renewable energy target [WIT-105242]. The production of renewable heat was the key objective of the RHI as long as it was displacing existing or potentially new heat generated from fossil fuels. Put simply, the level of return was a means to an end, not an end in itself. The role of the level of return or incentive was to drive uptake (which CEPA sought to model) and there was considerable uncertainty as to what this needed to be at the time of the introduction of both GB and NI RHI schemes.*

Achieving the renewables objective was the primary rationale for introducing both the GB and NI RHIs and without an appreciation of its role it is not possible to understand both how the schemes were designed and operated (including perhaps how even blatant gaming such as in the case of multiple boilers was treated by those responsible for administering and auditing the scheme). Whilst with the benefit of

hindsight more attention should have been paid to the potential for very high returns in both schemes at the time, as with any other renewable energy initiative established for the same purpose, the returns made by beneficiaries, which could vary significantly according to specific circumstances, were secondary. The principal aim was to achieve the renewable output targets at least cost or else maximise what could be achieved for the available budget. Without the existence of this objective such a large quantum of public resources would have unlikely to have been made available for renewable heat.

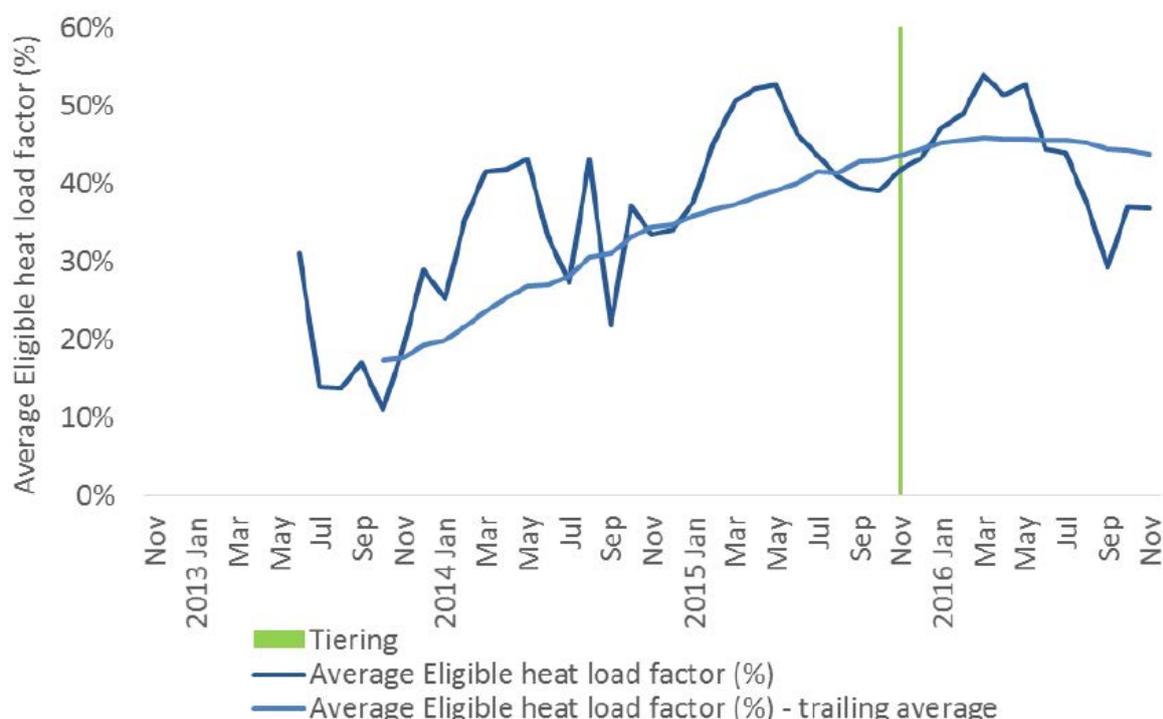
To a degree the overriding percentage heat output target could explain the relative “hands off” approach to both load factor and multiple boilers by DECC and Ofgem, even though from 2013 at least, DECC was fully aware of how the perverse incentives were operating within the GB scheme. [WIT-108126]. The importance of the target may also explain why there was such a reliance on biomass to achieve it, rather than seeking greater uptake of the other technologies supported under both RHIs (although the GB scheme made more effort in this regard than NI). It should also be noted that DECC’s approach in 2011 was to see biomass as being carbon neutral and therefore as eligible for support as any other renewables technology.

The Inquiry’s focus on returns given the abuse and gaming of the scheme who would appear to have knowingly and excessively exploited the various weaknesses in design and administration of the scheme is understandable, even though in reality only a small proportion accounted for a significant proportion of the scheme’s cost (CEPA estimates suggest 10% of beneficiaries accounted for 42% of costs). These included breaches of not only the spirit but also the letter of the scheme rules, the latter being an important point that I will return to, not least because a measure of the extent of this is now available which could potentially be used to recover at least a proportion of the NI RHI’s costs. However, as we have previously shown and will reiterate, measuring returns for biomass investment is difficult, they vary according to the specific circumstances facing a given boiler and would be subject change over the life of the investment given movement in different biomass and counterfactual fuel costs; and as with other such schemes, a different level of incentive (return) being required at different points in the scheme’s lifecycle to stimulate uptake.

Therefore, what was not known at the time of the introductions of both RHIs was the actual return required to incentivise a given level of up-take, although it is usual for the required return to be higher with novel new schemes which reduces as familiarity increases and the perceived risks decrease. Indeed, some schemes have provided for variable levels of return depending upon the level of uptake. For instance, in the case of ROCs/NIROCs, if supply of renewable output was below target, this led automatically to an increase in the level of return to stimulate higher levels of renewable electricity supply (with presumably this being accepted by the European Commission from a State Aids perspective, otherwise the approach would not have been allowed).

Given the challenges of over and under-incentivisation, many schemes are initially much more generous than they ultimately become through tariff reviews and or automatic mechanisms such as depression – as occurred with the GB RHI, the latter essentially involving the “discovery” of the “true” subsidy required for a desired level of uptake. What makes the NI RHI unique is that over time it became more and more generous as its tariff and banding structures became increasingly exploited and / or gamed – which can be seen in the increasingly high load factors that successive accredited boilers were claiming for.

Figure 4.10: NI RHI - Average eligible load factor (%)



Source: Ofgem

It can also be seen in the increasing average payments under the NI scheme compared to that of GB. (it should be noted that the *modal* level of payment in the GB scheme, assuming a 199kW boiler, would have been closer to £20,000 per annum, much closer to the NI average).

Figure 5.7: Trailing average subsidy paid in NI and GB in £/year



Source: Ofgem

Effective scheme monitoring, as recommended in CEPA's 2011 report would have picked up both load factor and payment trends, as well as boiler sizing enabling informed changes to tariff levels. For instance, high load factors and boiler capacities, compared to the initial estimates of 17% and 50kW, would have pointed to the potential for a significant reduction tariff levels (potentially avoiding the perverse incentives which plagued the NI RHI).

### Challenges in calculating RHI returns for biomass

*A key issue with focusing on returns as a measure of what was acceptable or not begins with the challenge of calculating the return for a whole population of potential investors with very different underlying heat requirements and specific circumstances. Whilst it is possible to point at certain returns as being excessive, it is more difficult to opine as to what an acceptable level of return should be.*

In theory and for purposes of calculating a tariff, the return for RHI was calculated as the difference in projected capital and operating costs, plus a 12% return, between the renewable and fossil fuel counterfactual. As such, it was calculated as a relative rather than an absolute return and importantly one that can vary over the life-time of the investment given different movements in fossil and biomass fuel costs (which are uncorrelated). It also differs according to both the type of biomass fuel (chips or pellets) and the counterfactual fuel (heating oil, mains gas or LPG). As it turned out, in the case of the poultry industry, the *relative* return as against the counterfactual would have been lower if Moy Park was simultaneously cutting fuel allowances as poultry farmers joined the scheme.

The tariff was calculated on a per kWh basis – the lower the level of consumption in terms of estimated run hours multiplied by the assumed capacity of the median boiler, the higher the tariff needed to be. Conversely, an outturn of greater per kWh consumption, either because of load or boiler capacity, would imply a lower tariff requirement (as discussed above).



In both the cases of the NI and GB schemes, load and capacity assumptions were provided by AEA Technology / Ricardo [TRA-02187], to calculate the tariff required to deliver such a relative return with estimated heat use being based on building space as this was the only comprehensive data set that existed. No data set was available for specific underlying uses such as agriculture. Having such a data set was necessary in order to model uptake – that is, the response to the incentive. The limitations of this approach were recognised by DECC in 2013, when it reviewed the GB RHI, in terms of the considerable range of load factors in heat use driven by underlying economic activities [WIT-106793, TRA-00498].

Ultimately, whilst the tariffs that were initially calculated turned out to be more generous than would have been necessary to achieve the objectives of the scheme - as with any novel initiative of this type - it was necessary to start somewhere, but it was vital to ensure that the tariff and the justification for it were kept under review by the scheme operator.

The 12% return was therefore an *input* assumption, *not a targeted measure of output* (only the median boiler in terms of load factor and capacity would have realised such a return). There was always going to be a range around this: not only would there be different sized boilers within a band, but also different uses requiring different run times. The extent of this range and how it might evolve over time – for instance with the growth of the poultry industry in NI, was just simply not known, nor could be anticipated in 2011/12.

As set out, from a policy perspective, the aim of the return or degree of incentive was to drive uptake; the return was never an end in itself. The role of a financial incentive to business is to increase profit, thereby compensating for any increased cost or business risk resulting from adopting the technology to which the incentive is attached. There was also considerable uncertainty over what return would have been required to effect a high level of uptake (despite relatively sophisticated models). Methodologically, at the extreme, if a 12% return had been a cap, DECC would have had to have calculated a tariff for a boiler at the top of a given capacity band with 100% load factor and free fuel, not a median one with a representative load and positive fuel costs. Put another way, the DECC methodology aimed to give a 12% return to the median (essentially average) boiler. By definition, some boilers will be “above average” and so would expect to receive a return of above 12%.

Finally, it should not be forgotten that at the time these schemes were being designed and put in place, much less was known about renewable heat than is known today. The GB RHI indeed was ‘first of a kind’ [TRA-00433]. It is inevitable that such ground-breaking schemes will need to be heavily modified in the light of experience, which again emphasises the importance of continued monitoring and review [TRA-00711].

## Returns and value for money

*The Inquiry has also focused on returns as a measure of value for money [TRA-01388]. Whilst this is not incorrect, it was not the measure of value for money that DECC was focused on.*

As we set out in [WIT-107764], at the time of the design of both the GB and NI schemes, the value for money metric was stipulated as the subsidy cost per kWh not the level of beneficiary returns, in line with maximising the impact of a given level of subsidy. As stated, this was because the main focus for everyone involved in developing and operating the scheme was on the achievement of the renewables target and with there being considerable uncertainty as regards what level of incentive would be required to “kick start” interest in renewable heat.

This value for money measure was set as a tariff in pence per unit of output (kWh), the cap for which was benchmarked to the subsidy paid to off-shore wind at c8.5p/kWh in [2010] prices.

An implication of this from a policy perspective is that it does not matter whether it is one or several boilers that delivers a given volume of heat output at a given per kWh rate. Of course, the objective should have been to push this average subsidy rate down as far as possible– which would have been in line with maximising the benefit and/or minimising the cost of the scheme. As we set out below, an opportunity to do this was lost in both NI and even GB initially, although over time this was helped with degeneration.

## Returns and state aids

*Whilst all schemes technically faced constraints on returns given State Aids considerations [TRA-00130], in the case of NI, these may not have bitten on an individual boiler basis.*

State Aid rules may not apply when the level of revenue is below the *de minimis* threshold, which it would have been for a single boiler (although it is not clear how this would apply in the case of agriculture where state aid rules are tougher). Nor is it clear whether or not the Commission would act if it believed there was a breach (as it would appear there certainly has been in the case of multiple boilers in both GB and NI, particularly where the beneficiaries are in the agricultural sector).

## Returns and breaches of scheme rules

*Finally and most importantly, the only clear stipulation in the scheme rules – but a critical one at that - was that heat could not be generated principally just to harvest the tariff [TRA-00162]. There is a critical distinction between gaming of the scheme rules, such as in the case of boiler sizes, and a clear breach of the scheme rules, which is subject to sanction. There are obvious parallels that can be drawn between this and the differences between tax avoidance and tax evasion (the former often involving using the tax code in a way that was never intended in order to reduce tax*

*liabilities, but with the latter being strictly illegal and therefore subject to the full force of the law).*

*In terms of remedy, focusing on rule breaches – which whilst it will be highly correlated with levels of returns – is probably a more fruitful way of addressing overcompensation than a pure focus on returns which, as set out, can be problematic, unless state aid rules can be enforced.*

The main difference with RHI to other comparable schemes was the greater ability to manipulate generation under RHI, which was however, a clear breach of the scheme rules, where it was being undertaken principally to receive the subsidy. In NI, those boilers with the highest returns, not least associated with implausibly high load factors of sometimes 100%, are likely to have been in clear breach of scheme rules, and ought to be held accountable by the authority charged with monitoring and enforcing compliance with the scheme rules.

Whilst acknowledging that the scheme should not ideally have been capable of being manipulated in such a way for no genuine economic purpose, what happened was still *a breach of not only the spirit but also the letter of the scheme rules*. Indeed, there are many instances in life where individuals can face incentives to break the law for personal financial gain and may even think they can get away with it; for instance in the case of taking cash payments and not declaring them. However, such actions are still illegal and subject to sanction. In the case of egregious “burn to earn” breaches of the scheme rules, where these can be evidenced it is difficult to see why any associated financial outlays should not be pursued from the abusers of the scheme as a matter of principle.

Evidence that we consider capable of demonstrating *prima facie* rule breaches now exists. Reduced heat consumption since the introduction of tiering for pre-November 2015 NI accreditations, where no other plausible explanation exists, is certainly *prima facie* evidence of generating heat principally to receive the tariff. Recent results after a year of tiering for all show a reduction of about one third in terms of kilowatt hours of heat generated. This is likely to be a reasonable proxy for the amount of heat which was generated principally to receive the subsidy (as set out, a serious breach of the scheme rules).

### **Perverse incentives**

*The main flaw in both the NI and GB schemes was that a perverse incentive was created whenever the tariff level was greater than marginal generation costs and where the potential to exploit the scheme made commercial sense. This clearly also occurred with the Tier 1 tariff in the GB scheme as well as the single tariff in the NI scheme.*

As set out, the way RHI was supposed to work in both NI and GB was by offering a return on the capex and operating costs of renewables relative to an assumed counterfactual fossil fuel. In reality, instead, wherever the tariff was above marginal

generation costs it incentivised different forms of gaming behaviour by at least a subset of beneficiaries who sought to maximise returns either within the rules (where heat was not wasted) or in breach of the rules (where heat was wasted).

In GB, tiering reduced the perverse incentive to waste heat through high, unsupported load factors, but not through boiler over-sizing. This also led to the multiple boiler problem in both NI and GB and militated against reducing the average RHI tariff, thus reducing value for money, although degression in the GB scheme did eventually bring down tariffs reducing the perverse incentive, at least for new accreditations.

In turn this behaviour would appear to have been tolerated by lax accreditation and auditing procedures. This is problematic as pure incentive / dis-incentive arrangements cannot solely be relied on to police a scheme as it is impossible to provide for every eventuality through incentives / dis-incentives alone.

As set out above, however, in NI there is considerable evidence of breaches of the scheme rules by generating heat principally to maximise tariff payments and not to support a legitimate activity. Ironically, given the view that abuse was greater in NI, unlike in GB it is much easier to identify the wasted heat problem (and rectify it) associated with run times, which can be changed, than through over-sizing of boilers, which cannot.

With considerable hindsight the main way to avoid this perverse incentive would have been to make sure it never existed by always ensuring that the tariff was at or better still, significantly below marginal generation costs, at all load factors. This could have been achieved by a mix of upfront grant and ongoing tariff (which was specifically explored in CEPA 2011) in our sensitivity analysis, although as a way of reducing barriers to uptake rather than avoiding a perverse incentive. In any event, in the case of NI, once high heat loads and 99kW boiler capacities became evident, the tariff could have been reduced to create a 12% return incentive with a flat tariff that was lower than marginal generation costs.

The issue in both schemes was therefore a lost opportunity to deliver a similar amount of biomass generated heat but with a materially lower average subsidy tariff. One of the reasons for this not happening was the distortion created in both GB and NI by the tariff being greater than marginal generation cost (whether up to 15% in GB or at any heat output in NI) which drove perverse behaviours, as heat generated became more about burning to earn through exploiting load factors and capacity bands than being driven by underlying load and capacity requirements.

Whereas it is clear what happened in NI as regard load factor, arguably in GB load factors were suspiciously grouped around 15% whereas it might be expected that the very different heat uses would have seen a much greater range. It is possible, for instance that boilers heating the same space were run in sequence in GB, exploiting the Tier 1 higher tariff, in which Tier 1 subsidies for multiple boilers would have been received rather than a Tier 1 and then Tier 2 for a single boiler.

In the case of single boilers, boiler oversizing looks to have occurred in NI where the capacity ceiling was 99kW whereas in GB it was double this as the ceiling on the lower band was 199kW (it also occurred in the 200kW to <1MW band as the tariff was still significantly above marginal generation cost). As we have previously pointed out, the average tariff for the smallest band biomass was higher in GB than in NI, implying lower value for money in GB than NI (if DECC's approach is followed).

### **Near inevitability of high returns with twenty year tariffs**

*The Inquiry has recognised that twenty year tariffs have the effect of “forward loading” investment compared to upfront grants [TRA-00079]. However, twenty year tariffs are also almost inevitably going to produce higher levels of returns when combined with a need for early investment payback, specifically where additional biomass investment was financed through bank loans. Without early payback, uptake would have been much curtailed. As a result, wider availability of bank loans may have contributed to greater scheme uptake, but also potentially to higher load factors, which as shown in the diagram above increased over the life of the NI RHI.*

Whilst there is always a preference for cash now rather than tomorrow, a particular issue with a tariff designed to deliver a return over twenty years is that unless the revenues are considerable (and hence returns greater), pay-back may not occur within the term of the loan, creating a disincentive to uptake. This will result in either low levels of uptake or an incentive to maximise revenues in order to bring forward pay-back. Once payback has occurred the rest of the life of the tariff will be profit, boosting the overall investment return.

From the investor perspective this is all about cash-flows, their level, and when they occur. From this perspective the fact that a proportion of the tariff relates to capital cost and the remainder operating cost is neither here nor there. It is entirely irrelevant.

This is another reason why there were attempts to maximise revenues through maximising capacity within a band (over-sizing in both GB and NI) and high load factors (NI). Clearly a proportion of scheme beneficiaries – especially those with multiple boilers were more likely driven by return considerations; however, others could have been driven more by payback requirements (on bank loans), but with higher returns inevitably flowing from this.

Both of these problems would have been addressed though the provision of full or partial upfront grants, rather than twenty year RHI tariffs. As set out above, this issue was explored by CEPA (2011) particularly from the perspective of financing constraints for households and subsequently in our later work on the domestic scheme in 2013, both of which could have been referred to by the Department at any point in the NI scheme's life.

## What would have happened if tiering had been introduced in NI?

*Applying the DECC approach would have clearly led to a tiering in NI. This is not in dispute. We will never know, however, how a tiered alternative might have played out and any counterfactual scenarios can only be speculative. It is possible that the scheme might have “ticked over” [TRA-12240] as some would appear to have assumed, although for the reasons set out above we believe that on the other, it would have been more likely that uptake would have been even more limited, risking NI missing its renewables target. In such a scenario it is certainly plausible that if there had been low uptake, the NI RHI may have been revised to make it more attractive – most likely by adopting the GB tariff structure. Had this happened, in the absence of appropriate monitoring and separate budgetary control, it is difficult to see how the NI budget would not also have been extensively breached in such an alternative scenario, given that the GB scheme was similarly highly attractive before depression reduced returns.*

Returns and hence payback would have been much reduced had the NI tariff been tiered initially, with the only way to increase returns or accelerate payback being through maximising boiler size. There is therefore no doubt that tiering would have reduced the attractiveness of the scheme. This would also, of course, have made the NI scheme much less attractive than that operating in GB, where the Tier 1 tariff was close to being 2p higher and where the lowest band went up to 199kW, in itself with double the earning power of a 99kW boiler (noting that revenues earned are a combination of boiler capacity [kW], running time [hours] and weighted average tariff rate).

With a lower tariff (c6p [NI] versus c7.9p [GB Tier 1 tariff] at the introduction of both schemes) and more limited ability to oversize boilers (99kW in NI versus 199kW in GB), the NI scheme would have been much less attractive, potentially to the point that after financing considerations were taken into account, the scheme would not have been of much interest to investors; for instance, at a 15% load factor this would amount to  $99\text{kW} \times 6.0\text{p} \times 1314 = \text{£}7,805$  in NI revenues per year, compared to over £20,000 per year for a top of the band GB boiler [ $7.9\text{p} \times 199\text{kW} \times 1314$ ]. The need for such high returns was made by a boiler installer in evidence to the Inquiry (although it was also noted that these would be reduced to new accreditations once interest in the scheme was established [TRA-04542]).

For the reasons set out above, there are questions as to whether the returns available from such a tiered tariff would have been sufficient to overcome potential financing constraints. In addition, such a difference may have caused a delay in investment in the hope that the GB tariff structure would have been adopted in NI. This would have put meeting NI's renewables objective at risk. Whilst a heavily revisionist analysis and therefore an unknown, given this risk, together with the likely large cheques being written back to the UK Treasury, it is more than plausible that the scheme would have been revised to be more generous with the GB tariff structure(s) being an obvious (although not the only) choice. Again, whilst it is not



clear the extent to which this arrangement might have been gamed, the potential for multiple 199kW boilers in poultry sheds must have been more than possible given what happened in GB.

Even if the structure had been the same this would not have prevented a budgetary breach, as the NI budget was separate to that of GB, with the budgetary impact being determined by the market response to the tariff structure solely in NI. In the absence of monitoring, review and budgetary control it is difficult to see how a similar scenario would not have unfolded, in terms of the budget being exceeded to a significant degree. Or put another way, irrespective of whether a scheme is under or overly generous, it still needs robust budgetary control.

Of course, had NI had joined the GB scheme where – as with Wales and Scotland - it would likely have had more than a Barnett 3% share of the available budget [WIT-107909]. It goes without saying that in such a scenario none of the issues investigated by the Inquiry would have come to light.

#### Statement of Truth

I believe that the facts stated in this witness statement are true.

Signed: \_\_\_\_\_

Dated: 7 November 2018