Title: Government response to the Consultation on controlling the costs of biomass conversion and co-firing under the Renewables Obligation **IA No:** BEIS027(F)-17-EEAU **RPC Reference No:** N/A **Lead department or agency:** BEIS **Other departments or agencies:** N/A	**Impact Assessment (IA)** **Date:** 31/05/2018 **Stage:** Government Response **Source of intervention:** Domestic **Type of measure:** Secondary Legislation **Contact for enquiries:** RO@beis.gov.uk

Summary: Intervention and Options

RPC Opinion: N/A

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANDCB in 2014 prices)	**One-In, Three-Out**	**Business Impact Target Status**
£986m	£N/A	N/A	N/A	Not a regulatory provision

What is the problem under consideration? Why is government intervention necessary?

Biomass conversions and co-firing technologies are supported through the Renewables Obligation (RO). The costs of the RO are managed through the Levy Control Framework (LCF), which sets an annual budget for the overall costs to consumers of Government levy-funded low carbon electricity policies. In the absence of intervention, additional biomass conversion and co-firing deployment may put significant pressure on the LCF, adding costs to consumer bills.

What are the policy objectives and the intended effects?

The policy objectives are to protect the LCF and limit the costs to consumers of additional unforecast RO spend on biomass conversion and co-firing.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

The final policy options under consideration are:

- **'Do Nothing'** (the reference case): non-grandfathered biomass conversions and co-firing generators would face no limit on the number of Renewables Obligation Certificates (ROCs) that they could claim;
- **Amended cap mechanism**: an annual allowance for each affected station of 125,000 ROCs per non-grandfathered unit, while also allowing operators to optimise generation between non-grandfathered units and, where applicable, grandfathered units within a station up to the level of a station cap.

Following consultation, the amended cap mechanism is the preferred option for meeting the policy objective.

Will the policy be reviewed? It will not be reviewed. **If applicable, set review date:** N/A

Does implementation go beyond minimum EU requirements?		N/A		
Are any of these organisations in scope?	**Micro** No	**Small** Yes	**Medium** Yes	**Large** No
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)		**Traded:** 0.2 – 1.2	**Non-traded:** N/A	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading Options.

Signed by the responsible Minister: Richard Harrington Date: 16/01/2018

Summary: Analysis & Evidence — Amended cap mechanism

Description: Amended cap mechanism – an annual allowance for each affected station of 125,000 ROCs per non-grandfathered unit, while also allowing operators to optimise generation between non-grandfathered units and, where applicable, grandfathered units within a station up to the level of a station cap.

FULL ECONOMIC ASSESSMENT

Price Base	PV Base Year	Time Period	Net Benefit (Present Value (PV)) (£m)		
2011/12	2018	Years 10	Low: 396	High: 2,271	Best Estimate: 986

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-	-	5	**39**
High	-		27	**223**
Best Estimate	-		12	**97**

Description and scale of key monetised costs by 'main affected groups'

As a result of a reduction in biomass generation due to the introduction of the amended cap mechanism, we expect higher levels of gas-based electricity generation than under the 'Do Nothing' counterfactual. This leads to higher levels of carbon emissions in the electricity sector (PV £39m – £223m).

Other key non-monetised costs by 'main affected groups'

Ofgem as the scheme administrator are expected to incur some costs, however these are deemed to be negligible.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	-	-	52	**435**
High	-		300	**2,494**
Best Estimate	-		130	**1,083**

Description and scale of key monetised benefits by 'main affected groups'

This policy may lead to the substitution of some biomass-fuelled electricity generation with gas-based generation. This substitution may reduce generation costs by between PV £435m - £2,494m.

Other key non-monetised benefits by 'main affected groups'

The reduced RO spend compared to the 'Do Nothing' scenario is a transfer and therefore not quantified as an economic benefit.

Key assumptions/sensitivities/risks — **Discount rate** 3.5%

- Load factors: the extent to which the Levy Control Framework is put under pressure is contingent on assumptions around how much biomass conversions and co-firers will generate using biomass. Low, central and high scenarios are tested, informed by historical data and evidence provided during consultation (see Annex B).
- Generator response to policy options: Before consultation, due to insufficient evidence indicating the likely effects of the proposed policies, our draft Impact Assessment assumed that Government intervention would not affect generation behaviour at biomass co-firing or conversion units. Evidence provided during the consultation has been used to update the assumptions for this Impact Assessment.

BUSINESS ASSESSMENT (Options A/B)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: N/A	**Benefits:** N/A	**Net:** N/A	N/A

Background

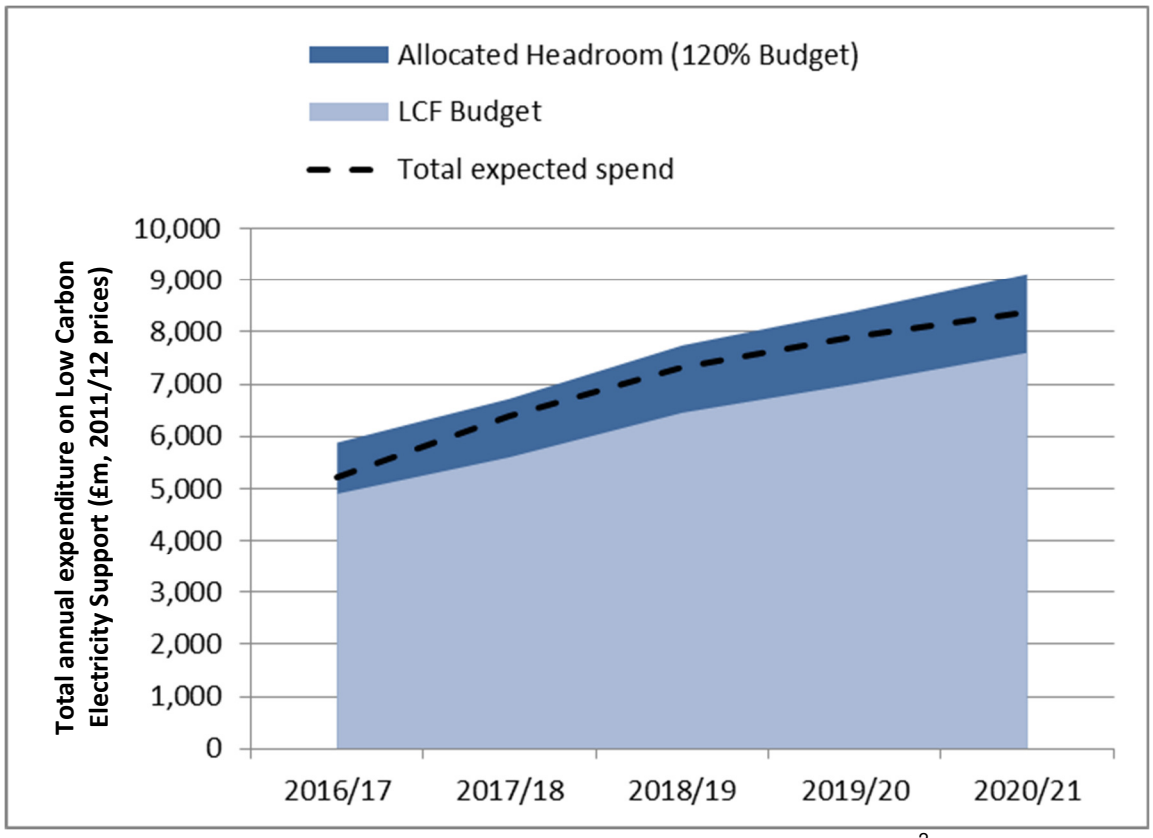
1. The previous consultation stage Impact Assessment (IA) was published on 15 September 2017 alongside the *Consultation on controlling the costs of biomass conversion and co-firing under the Renewables Obligation.*[1]

2. This final stage IA provides an updated assessment of the impact of the original proposals consulted on and the final policy. Answers and evidence supplied in response to the consultation, which closed on 27 October 2017, have been incorporated into this IA.

Rationale for intervention

3. In November 2017 the Office for Budget Responsibility (OBR) published updated projections for the costs of environmental schemes covered by the LCF (Figure 1), of which RO costs are the largest component. Figure 1 shows that the LCF budget is projected to be exceeded in all years to 2020/21 by around £1bn but spend will stay within the 20% LCF headroom permitted to reflect the inherent volatility of support costs. Any increase in projected spend under a support scheme under the LCF will take expected expenditure increasingly over the budget cap, adding further costs to consumer bills.

Figure 1 - Projected Levy Control Framework Expenditure, 2016/17 – 2020/21 (2011-12 prices)



Source: Office for Budget Responsibility Economic and Fiscal Outlook, November 2017[2]

4. As described in the consultation stage IA, despite changes to grandfathering policy announced following consultation in 2015, Ofgem data[3] suggested that deployment of biomass conversions could be significantly higher than estimated in the LCF forecasts published in March 2017. This

[1] https://www.gov.uk/government/consultations/controlling-the-costs-of-biomass-conversion-and-co-firing-under-the-renewables-obligation
[2] http://cdn.budgetresponsibility.org.uk/Nov2017EFOwebversion-2.pdf, converted to 2011/12 prices using the relevant inflation index.
[3] Data on ROCs issued can be found in Ofgem's publicly available Certificates Register: https://www.renewablesandchp.ofgem.gov.uk/Public/ReportManager.aspx?ReportVisibility=1&ReportCategory=0

potential increase in deployment was unforeseen when the current support levels for biomass conversion and co-firing were set in 2012.

5. Evidence gathered during the consultation suggests that potential deployment of non-grandfathered biomass conversion and co-firing could in fact be higher than estimated under the central scenario modelled in the consultation stage IA. This deployment may result in spend under the RO of around £135m to £240m per annum (2011/12 prices, central estimate) and an increase to average household bills of £1 to £2 per annum from 2019/20 (2011/12 prices, central estimate).

6. Further detail on the RO spend and consumer bill impacts of the 'Do Nothing' reference case and the proposed policy option considered is set out on pages 5 and 6.

Description of options reviewed

7. The following Options are considered in this IA:

   - **'Do Nothing' (the reference case)**: non-grandfathered biomass conversions and co-firing generators would face no limit on the number of Renewables Obligation Certificates (ROCs) that they could claim.

   - **Amended cap mechanism**: an annual allowance for each affected station of 125,000 ROCs per non-grandfathered unit, while also allowing operators to optimise generation between non-grandfathered units and, where applicable, grandfathered units within a station up to the level of a station cap. This is an amended version of Option A considered in the consultation.

Do nothing

8. Under this option, no intervention would be taken to cap the number of ROCs issued to biomass conversion or co-firing units under the RO. Generators would continue to receive the support rates set out in Annex A.

Amended cap mechanism

9. This option is similar to Option A proposed in the consultation document, but with a slightly higher ROC allowance for non-grandfathered units and with operators given flexibility to optimise generation between biomass units within a station. This allows them to operate when most required by the system, i.e. at times of high system demand and low intermittent renewable output.

10. For affected biomass conversion and co-firing stations[4] that comprise only non-grandfathered units, the cap mechanism will operate as follows:
    - A station cap of 125,000 ROCs per Obligation year per RO-eligible unit will be applied to generation eligible for ROCs at the biomass conversion and co-firing bands, including 'Co-firing of regular bioliquid and 'Low-range co-firing of relevant energy crops'.
    - Stations will be able to optimise generation between units and decide whether they use a single unit or more than one unit to generate up to the level of their station cap.

11. For affected stations that comprise both grandfathered and non-grandfathered units, the cap mechanism will operate as follows:
    - At the time of setting the Obligation each year, BEIS will publish a 'grandfathered unit forecast', stating the number of ROCs expected to be issued to grandfathered units at these stations in the upcoming obligation year. BEIS is already required to estimate the number of ROCs that are likely to be issued in the upcoming Obligation year in order to set the Obligation.

[4] These fall into the definition of Relevant Fossil Fuel Stations as set out in Schedule 5 Part 1 of the Renewables Obligation Order 2015.

- The station will have a 'non-grandfathered unit allowance' of 125,000 ROCs per RO-eligible non-grandfathered unit per obligation year for generation eligible for ROCs at the biomass conversion and co-firing bands, including 'Co-firing of regular bioliquid and 'Low-range co-firing of relevant energy crops'. The level of this allowance is consistent with the cap for stations only comprising non-grandfathered units.
- A station forecast will be calculated by adding together the grandfathered unit forecast and the non-grandfathered unit allowance.
- If and to the extent that the number of ROCs issued to grandfathered units in the Obligation year is lower than the grandfathered unit forecast, non-grandfathered units will have flexibility to receive ROCs over the level of the non-grandfathered unit allowance. In this case, the number of ROCs issued to the station in the Obligation year will not exceed the station forecast.
- Alternatively, operators may choose to maximise generation at grandfathered units such that the number of ROCs issued to grandfathered units in the Obligation year exceeds the grandfathered unit forecast. In such circumstances, non-grandfathered unit(s) will not be issued ROCs above the level of the non-grandfathered unit allowance.

12. Further information on how the cap will be implemented can be found in the Government response document that accompanies this Impact Assessment.[5]

Impact of the amended cap option

13. This section outlines the costs and benefits of introducing an amended cap against the 'Do nothing' baseline.

Distributional impact

14. The impact on RO spend of introducing an amended cap mechanism is considered below and demonstrates that the policy option is likely to reduce RO spend compared to 'Do Nothing' (see Table 1). Reductions in support costs represent a transfer from generators to consumers. For this reason potential reductions in RO spend are not reflected in the overall cost-benefit analysis of implementing the amended cap.

Table 1 – Estimated level of annual RO spend from non-grandfathered biomass co-firing and conversion units from 2019/20 (2011/12 prices)[6]

Policy Option	Low	Central	High
'Do Nothing'	£55m	£135m - £240m	£320m
Amended cap mechanism	£5m	£20m	£20m

15. Under the 'Do Nothing' option, conversion units (without CHP) are eligible for a support rate of 1 ROC/MWh, while co-firers (without CHP) are eligible for 0.5 – 0.9 ROCs/MWh depending on the level of co-firing. Increased deployment scenarios for 2019/20 equate to spend under the RO of £135m - £240m in 2019/20 (central scenario) for non-grandfathered biomass conversions and co-firing units. The extent to which non-grandfathered units will claim ROCs under the Do Nothing scenario is uncertain, and therefore a range is estimated around even the central scenario. This additional spend would continue until 2027, when RO support for biomass conversion and co-firing will end.

16. The estimated impact of the 'Do Nothing' option on the bills of average electricity consumers (see Table 2). This could result in additional costs on household consumer bills of £1 - £3 per annum from 2019/20.

[5] https://www.gov.uk/government/consultations/controlling-the-costs-of-biomass-conversion-and-co-firing-under-the-renewables-obligation
[6] The inclusion of low, central and high scenarios reflects uncertainty in these forecasts. See Annex B for assumptions used for each scenario. Estimates are rounded the nearest £5m.

Table 2 – Estimated level of average annual impact on electricity bills 2019/20 (2011/12 prices) of doing nothing[7]

Type of energy consumer[8]	Low estimate	Central estimate	High estimate
Average impact across all households (dual fuel)	£1	£1 - £2	£3
Business user with small electricity consumption	£30	£80 - £140	£180
Business user with medium electricity consumption	£1,300	£3,200 - £5,800	£7,700
Energy intensive industrial user	£11,800	£29,400 - £53,000	£69,700

17. The bill impact estimates set out in Table 2 are largely driven by increases in LCF support costs above the forecast. We expect that the bill impacts set out in Table 2 would be largely avoided as a result of the introduction of the amended cap mechanism.

Monetised impacts

18. This section sets out the estimated monetised impacts quantified in this IA. Annex B sets out the key assumptions made.

'Do nothing'

19. If there is no intervention we estimate that there would be a significant amount of unforecast generation at the biomass conversion and co-firing bands under the RO. 'Do nothing' is the baseline against which interventions are assessed.

Amended cap mechanism

20. This option could result in annual RO spend on non-grandfathered biomass conversion and co-firing of between £5m and £20m in 2011/12 prices (Table 2). This option offers certainty about maximum potential spend at the relevant bands.

21. In terms of the administrative costs of implementing this option, Ofgem officials have estimated that these would be minimal.

22. With regards to the additional, wider impacts on society, this option is likely – according to consultation responses received – to allow non-grandfathered units to continue to operate as biomass conversion or co-firing units. Introducing the amended cap mechanism would lead to higher greenhouse gas emissions due to higher non-renewable generation compared with the 'Do Nothing' scenario. We estimate that – depending on the generation profile – there could be around an additional annual 0.2m to 1.2m tonnes of carbon dioxide equivalent greenhouse gas emissions emitted. The equivalent estimated value is around £4m to £22m per annum in present value terms.

[7] See Annex B for Table 2 assumptions

[8] An illustrative Business User with Small Electricity Consumption is assumed to consume 260MWh of electricity per year. An illustrative Business User with Medium Electricity Consumption is assumed to consume 11,000 MWh of electricity per year. An illustrative Energy Intensive Industrial User (EII) has an assumed electricity consumption of 100,000 MWh per year but EII consumption varies significantly.

23. The introduction of the amended cap mechanism may reduce the amount of electricity generated by biomass. We have assumed that any shortfall in electricity supply as a result would be met through higher amounts of gas-based generation. As gas generation has lower resource costs, this is expected to save between £44m and £249m per annum (present value, 2011/12 prices).

Summary and preferred option

24. The amended cap mechanism is the preferred option for meeting the policy objective, as under the 'Do Nothing' scenario there would likely be additional spend under the Renewables Obligation of around £135m to £240m per annum (central estimate, 2011/12 prices), putting pressure on the Levy Control Framework.

Annex A: Current RO bands for biomass conversion and co-firing projects

Table A1: Current bands and support levels for biomass conversions and co-firers

Band	Description[9]	Support (ROC/MWh)
Co-firing of regular bioliquid	Less than 100% regular bioliquid co-fired in a unit	0.5
Low-range co-firing of biomass	Less than 50% regular biomass or energy crops co-fired in a unit	0.5
Mid-range co-firing of biomass	50% - less than 85% regular biomass or energy crops co-fired in a unit	0.6
High-range co-firing of biomass	85% - less than 100% regular biomass or energy crops co-fired in a unit	0.9
Biomass conversion	Electricity generated from 100% regular biomass, energy crops or regular bioliquids by a unit of a relevant fossil fuel station[10]	1.0
Low-range co-firing with relevant energy crops[11]	Electricity generated before 1 April 2019 from less than 50% relevant energy crops	1.0
Low-range co-firing with CHP[12]	Less than 50% biomass co-fired in a unit of a qualifying CHP generating station	1.0
Co-firing of regular bioliquid with CHP	Electricity generated from less than 100% regular bioliquid in a unit of a qualifying CHP generating station	1.0
Mid-range co-firing with CHP[12]	50% - less than 85% biomass co-fired in a unit of a qualifying CHP generating station	1.1
High-range co-firing with CHP[12]	85% - less than 100% biomass co-fired in a unit of a qualifying CHP generating station	1.4
Conversion with CHP	Electricity generated from 100% regular biomass, energy crops or regular bioliquids by a unit of a relevant fossil fuel CHP station	1.5
Low-range co-firing with relevant energy crops with CHP[11]	Electricity generated before 1 April 2019 from less than 50% relevant energy crops by a qualifying CHP generating station	1.5

[9] In each case up to 10% fossil fuel can be used in a unit for permitted ancillary purposes without affecting the eligibility of that unit for the band.
[10] As defined in Schedule 5 of the RO Order 2015.
[11] As defined in Article 36 of the RO Order 2015.
[12] For capacity accredited in or after 2015/16, these support levels are only available in circumstances where support under the Renewable Heat Incentive is not available. See Article 35 of the RO Order.

Annex B: Key assumptions

In Tables 1 and 2, the following assumptions are made in relation to generation levels:

- **Low:** This assumes some additional biomass conversion deployment with a load factor of 23.0%. This assumes plants would be running over the winter peak period only (e.g. January to March).

- **Central:** This assumes additional biomass conversion and co-firing deployment at more than one plant. Load factor assumptions are consistent with the RO setting for 2018/19 and where relevant, evidence supplied during the consultation.

- **High:** This assumes additional biomass conversion deployment at more than one plant. Load factor assumptions are consistent with the RO setting for 2018/19 and where relevant, evidence supplied during the consultation.

The greenhouse gas impacts are estimated using the following steps:

- Estimate **total generation** under the 'Do Nothing' and amended cap options by fuel, with the former assumed to be entirely using biomass, and the latter using a lower proportion of biomass and the difference made up from gas-fired generation. Generation is assumed fixed across both scenarios with only the fuel source of the generation changing.

- Estimate the **carbon intensity** of the fuels used. For biomass this is estimated using the Government's latest greenhouse gas conversion factors[13] for biomass-based generation, giving an estimated carbon intensity of 12.7gCO_2e/kWh[14]. For gas-fired generation an emissions factor is taken from the supplementary *Green Book* guidance on valuing greenhouse gas emissions,[15] estimated at 184gCO_2e/kWh.

- Apply the carbon intensity estimates to the generation estimates, giving **total emissions** from a fixed level of generation in each scenario, in tonnes of CO_2e per year.

- **Valuing the emissions** using the projected traded carbon price (£/tonne) set out in the supplementary *Green Book* guidance on valuing greenhouse gas emissions.

The change in generation resource costs are estimated using the following steps:

- Take the estimated total generation under each scenario (set out above), and apply a resource cost estimate per MWh of generation for both biomass and gas-based generation.

- The gas-based generation is valued using the long-run variable cost of gas values set out in the Government's supplementary guidance on valuing energy use and greenhouse gas emissions for appraisal[16] while the biomass-based generation is valued using biomass costs set out in the Government's electricity generation costs report[17].

[13] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2017

[14] Biomass emissions are assumed to be greater than zero due to emissions associated with fuel production.

[15] Available here: https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

[16] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2017

[17] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/566718/Arup_Renewable_Generation_Cost_Report.pdf