



Department
of Energy &
Climate Change

Climate Change Agreements Target Review 2016: Discussion Paper and Call for Evidence

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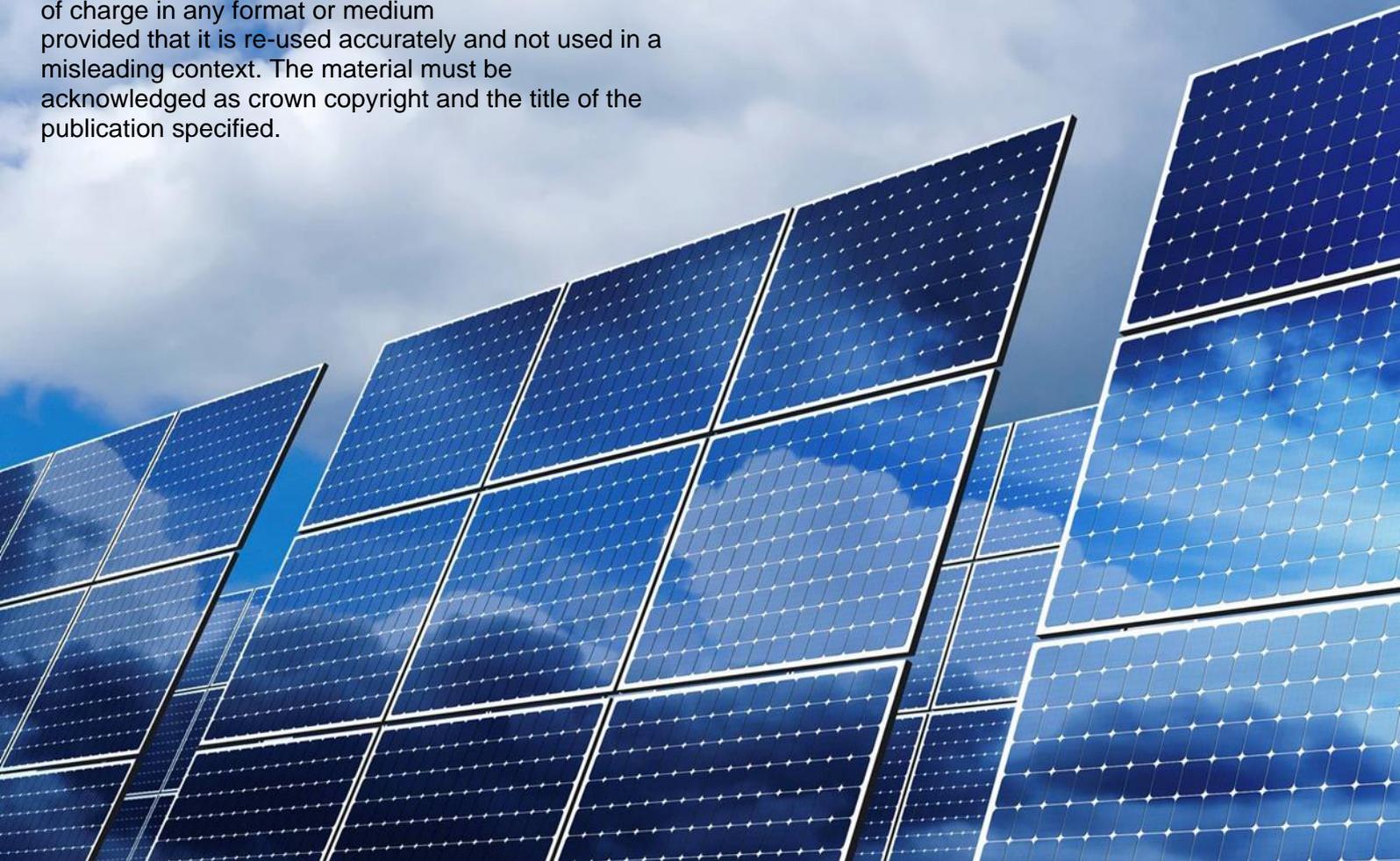
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Discussion Paper and Call for Evidence

This discussion paper sets out the Government's proposals for the 2016 Target Review and invites views from stakeholders on the proposed approach and methodology. This paper also includes a call for evidence to inform a review of sector commitments.

Stakeholder engagement process

This process is open for twelve weeks commencing on the 28th October 2014 and closing on the 23rd January 2015.

How to respond

We would be pleased to receive comments on any aspects of the proposals. We would also be interested in receiving any evidence relevant to issues raised in the Call for Evidence. Responses are welcome either by e-mail or post to the address above.

Confidentiality, data protection and data sharing

Information provided in response to this stakeholder engagement paper, including personal information, may be subject to publication or disclosure in accordance with the access to information legislation (primarily the Freedom of Information Act 2000, the Data Protection Act 1998 and the Environmental Information Regulations 2004).

If you would like information that you provide to be treated as confidential please indicate this in writing when you send your response to the stakeholder engagement paper. It would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded by us as a confidentiality request.

Our intention is that responses to the discussion paper may be shared with the Environment Agency as Scheme Administrator. We also intend to share information received in response to the Call for Evidence with the Environment Agency and their technical consultants. Furthermore, we propose to share information from the Call for Evidence more widely within DECC to inform wider Government policy-making on energy efficiency. Please could respondents indicate if they are not content for evidence they submit to be used for other purposes within DECC.

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Executive Summary

In the Government response to the September 2011 *Consultation on Simplifying the Climate Change Agreements Scheme* Government stated it “would proceed with the proposal to have a target review in 2016 (which can lead to targets getting tightened or eased)” and that the Review “is intended to make sure that targets are challenging but achievable for operators”. This paper sets out Government’s proposals for the 2016 Target Review and invites views from all stakeholders on the proposed approach, methodology and scope.

The purpose of the Review is to ensure that targets continue to reflect the full realistic potential for energy efficiency improvements or carbon savings. The key objectives are:

- to examine evidence on changes that have occurred since target setting in 2012 and identify sectors where this evidence points to a case for more detailed review of that sector commitment; then
- to assess whether and how the realistic potential for energy efficiency in the CCA sectors selected has changed since current sector commitments were agreed; and if appropriate, to agree revised sector commitments in accordance with the evidence. Revised commitments would be cascaded to target units through the established process.

We are proposing that the Review process comprises the following four stages:

- 1) **sift and select** - an initial review of all sectors in the scheme, to identify areas where changes in realistic potential may have occurred since targets were agreed in 2012, and to select sectors for detailed review accordingly;
- 2) **detailed review** of selected sectors to further quantify changes in realistic potential;
- 3) **agreeing new sector level commitments** with relevant sector associations where changes in realistic potential have been identified;
- 4) **cascading** revised sector commitments, through sector associations, to inform revised Target Unit targets.

There are also a number of policy and administrative issues relating to the scheme that could be looked at as part of or alongside the Review. These are set out in the main document.

It is proposed that DECC will take the decisions on which sectors will be selected for detailed review, will propose revised targets based on the evidence, and will be responsible for the process of agreeing new sector commitments. The Environment Agency, as scheme administrator, will conduct the key technical and analytical aspects of the Review in support of DECC’s decision-making role. We are considering the option of recovering the costs of the Review to Government through

the charges paid by scheme participants, which would be subject to a Charging Review and the agreement of ministers.

Call for Evidence

To ensure that the review is well-informed and thorough this paper also includes a Call for Evidence inviting stakeholders to provide information on changes to abatement measures and techniques that underpin the current targets that may have occurred since targets were agreed in 2012.

We would appreciate your comments on any aspect of this discussion paper by 23 January 2015.

Introduction

1. CCAs are voluntary agreements that allow eligible energy intensive sectors to receive a reduction in the Climate Change Levy (the “CCL”) of 90% for electricity and 65% for gas and other fuels¹ if they sign up to stretching energy efficiency targets agreed with Government. A total of 53 industrial sectors across around 8,300² sites have signed up to targets. The original targets for this phase of the scheme were agreed in 2012³ and apply to participating sectors from 2013 to 2020, with the scheme running until 2023.
2. In the Government response⁴ to the September 2011 *Consultation on Simplifying the Climate Change Agreements Scheme* Government stated it “would proceed with the proposal to have a target review in 2016 (which can lead to targets getting tightened or eased)” and that the Review “is intended to make sure that targets are challenging but achievable for operators”. This paper sets out Government’s proposals for the 2016 Target Review and invites views from all stakeholders on the proposed approach, methodology and scope.
3. Government is required to review targets set under Climate Change Agreements every 7 years under Schedule 6 of the Finance Act (2000 as amended in 2012). The Umbrella Agreements indicate that the Secretary of State shall carry out a review of the sector commitment during 2016 for the target periods 1st January 2017 to 31st December 2018 and 1st January 2019 to 31st December 2020.
4. As set out in the September 2011 *Consultation on Simplifying the Climate Change Agreements Scheme* the Government’s intention is that target reviews “provide an opportunity to ensure that targets continue to reflect the full potential for energy efficiency improvements or carbon savings” and, “to ensure that the sector targets being reviewed continue to represent the potential for cost effective savings taking account of any changes in technical or market circumstances”.
5. This discussion paper sets out our initial proposals for this Review. It is our intention that the Review should provide an opportunity to work collaboratively with sectors to identify new and additional energy efficiency opportunities and to support these through the CCA targets framework. This also supports Government objectives to reduce CO₂ emissions and improve industrial energy efficiency, and in turn supports broader DECC and Government objectives on

¹ LPG and solid fuels (including coal, coke and petroleum coke)

² As at October 2014

³ NB Targets for data centres and sawmills were agreed in 2014 when these sectors joined the scheme

⁴ Published January 2012

tackling climate change, enhancing security of supply and promoting economic growth.

6. We intend for any revised Target Unit targets to be in place for the start of Target Period 3 at the beginning of 2017.

Purpose of the review

7. The purpose of the review is to ensure that targets continue to reflect the full realistic potential for energy efficiency improvements or carbon savings.

Objectives of the review

8. In line with this purpose, the objectives of the Review are:
 - to examine evidence on changes that have occurred since targets were agreed in 2012 and identify sectors where this evidence points to a case for more detailed review of the sector commitment; then
 - to assess whether and how the realistic potential for energy efficiency or carbon savings in the CCA sectors selected has changed since current sector commitments were agreed; and if appropriate, to agree revised sector commitments in accordance with the evidence. Revised commitments would be cascaded to target units through the established process.
9. As secondary objectives:
 - to gain additional evidence to ensure the CCA scheme remains evidence-based and, subject to the agreement of the sectors, for this evidence to be used to inform wider Government policy-making on energy efficiency.
 - to provide added impetus to the use of low carbon technologies where potential for additional take-up is identified.

Overview of the target review process

10. The target review process is designed to provide an assessment of whether a change in realistic potential for energy efficiency has arisen in the period since target setting in 2012 when CCA commitments for 2020 were agreed for each sector; and where possible to quantify any change in potential for sectors. Where a change in realistic potential is identified, DECC will seek to agree a new sector-level commitment by June 2016, to enable revised Target Unit targets to be in place by end-2016.

11. We are therefore proposing four stages for the Review process as below:
- 1) **sift and select** - an initial review of all sectors in the scheme, to identify areas where changes in realistic potential may have occurred since target setting in 2012, and to select sectors for detailed review accordingly;
 - 2) **detailed review** of selected sectors to further quantify changes in realistic potential;
 - 3) **agreeing new sector level commitments** with relevant sector associations where changes in realistic potential have been identified; and
 - 4) **cascading** revised sector commitments, through sector associations, to inform revised Target Unit targets.
12. We have already confirmed that we will review the sector commitments for sawmilling and data centres as new sectors in the scheme.
13. The sift and select and detailed review process might include consideration of generic technologies such as Combined Heat and Power (CHP) and Waste Heat Recovery, where there is evidence that potential exists and barriers previously identified have been overcome. There are also a number of policy and administrative issues relating to the scheme that could be looked at as part of or alongside the Review as discussed later in the document.

Methodology for the review of sector commitments

14. We have set out below our proposed methodology for the stages of the Target Review.

Sift and select

15. This would comprise a review of information across all sectors on changes that have arisen since targets were set in 2012 to inform an initial view on where and in which sectors there might be a change to the potential reflected by current commitments.

16. The following information would be taken into consideration:

- **Changes in technical and economic parameters and barriers:** This would include consideration of whether: any cost-effective new technologies or processes have been developed or identified since target setting in 2012; costs of technologies identified in 2012 have reduced more quickly than expected, so they are now cost-effective against the 6 year payback period adopted as the standard for the scheme; barriers identified in 2012 have been overcome or mitigated to the extent that a greater proportion of the cost effective potential identified in 2012 can be considered realistic potential; relative movements in technology costs and energy prices mean that the cost effectiveness of energy efficient technologies has changed.
- **Performance of sectors in Target Period 1:** We would take into account reporting information from Target Period 1 including any evidence that indicates there may be a change in the potential for 2020 targets. However, it would not be our intention to add unnecessary burdens on sectors which are making good progress on their targets.
- **Availability of existing information:** We would also take account of the currency of information available to Government relating to the opportunities for improvements in energy efficiency in each sector, including whether an evidence template was submitted in 2012.

17. In considering which sectors might be selected for detailed review, we would take account of factors such as the total energy used by the sector and total carbon emissions. This will ensure that the Review takes account of the overall environmental impacts of changes to sector commitments. We would also take account of potential beneficial side effects in terms of investment, innovation and growth opportunities to support growth and competitiveness.

18. On the basis of the outcome of the sift and select process, sectors would be selected by DECC for more detailed review. The sift and select process would be carried out during 2015, utilising Target Period 1 reporting data when this becomes available in late summer 2015.

Detailed review of selected sectors

19. The detailed review would focus on changes in technical and economic parameters and barriers as considered during the sift and select process. Three generic areas would be considered where specific changes since target setting in 2012 could give rise to additional potential:

- New demand side and supply side opportunities – e.g. new technologies or processes not available in 2012. This could also include measures existing in 2012 for which full account could not be taken during the 2012 target setting exercise.
- Changes in technology costs and fuel prices compared with assumptions made in 2012.
- Overcoming of barriers between cost effective and realistic potential cited in 2012.

20. We would aim for the detailed review to be completed by March 2016 to allow any revised sector commitments to be agreed by mid-2016, and for these to be cascaded to target units by the end of 2016.

Re-setting sector commitments

21. Once a detailed review of the selected sectors has been carried out, DECC would form a view on whether any sector commitments should be revised, based on the evidence, and any proposals would be presented to sector associations. DECC would intend to use the process for agreeing targets as set out in the 2011 consultation and used for 2012 target setting. i.e. Government would make a proposal to each sector. If the proposal is acceptable to the sector, this becomes the new sector commitment. Alternatively, the sector concerned has the option of making a counter proposal and submit supporting evidence. Further details of the procedure are set out in the Umbrella Agreements. An illustration of this process is set out in Annex B.

Adjudication

22. The Umbrella Agreement notes that if the Sector Association and the Secretary of State fail to agree on a variation of the sector commitment, either party may refer any dispute as to matters of fact to an adjudicator for adjudication. We propose

that were it necessary to appoint an adjudicator, an independent expert/experts in the relevant technical area, agreeable to both parties, would be selected.

Additional administrative and policy issues

23. We have previously set out our intention to review a number of other scheme issues by 2016. These are set out below, with our proposed way forward.

Buy-out price

24. The Government response to the Consultation on simplification, 2011 said “the buy-out price will be reviewed at the target review scheduled for 2016”.

25. We have no plans to adjust the buy-out price for the first two reporting periods of the Scheme i.e. before the end of 2016. As part of the Target Review, we will examine the extent of use of buyout in Target Period 1 once this data becomes available to inform any review of buy-out for Target Periods 3 and 4.

Amendment of absolute targets where throughput drops by more than 10%

26. Under the current CCAs, Target Units which have absolute targets have their targets tightened when their throughput falls by more than 10%⁵. This is set out in section 10.5 of the Operations Manual⁶. The rationale is that unless there is accurate prior knowledge of future throughput levels available, which would allow appropriate, challenging future targets to be set for absolute Target Units, the mechanism is necessary to ensure that targets remain challenging and conducive to the installation of energy efficiency measures. In the 2011 Consultation on simplification we indicated that Government has decided to retain this process which is consistent with that goal but its use will be reviewed alongside the targets in 2016.

27. Our view is that this mechanism should be retained in its current form, for scheme stability and predictability. However we would be grateful for views on whether review of this mechanism is a priority for scheme participants⁷.

Changing an Agreement

28. The Operations Manual⁸ states that: “To maintain stability within the scheme, a number of areas of an agreement cannot be changed. The next opportunity to

⁵ Specifically when production in a target period is less than 90% of twice the base year throughput

⁶ <https://www.gov.uk/government/publications/climate-change-agreements-operations-manual--2>

⁷ In response to the 2011 consultation, two respondents suggested that the Government reconsider this rule

⁸ See Section 7.7 of the Operations Manual: “What can’t be changed by a variation”

review these for a target unit may be during the 2016 target review”. This applies to:

- Target unit target (% value) unless there is a relevant variation
- Target type (absolute/relative)
- Throughput currency
- The 12 month base year period

29. In order to preserve scheme stability and policy intent, it is not our intention to allow individual target units to request changes in respect of the above. However, if under the Target Review a sector has its commitment revised, EA will discuss with the sector how to apply the revised sector target across Target Units.

Further items

30. In addition to the items above, we are aware that a number of issues relating to policy and administration of the scheme have been raised during Target Period 1. These are set out below, where appropriate, with an indication of the current position. We would be grateful for views on whether revisiting any of these issues would be a priority for scheme participants, and if so the reasoning for this.

Carbon Factors

31. Fixed carbon factors were set for the duration of the scheme in 2012. A number of participants have previously asked whether flexible carbon factors could be used, and/or whether alternative sources could be used for the carbon factors. The existing carbon factors underpin the 2008 baselines and were integral to setting the commitments. We are not intending to revisit carbon factors.

Adding new sectors

32. In the “Climate Change Agreements: Government Response to the September 2011 Consultation”, DECC stated that no new sectors will be permitted to enter into new agreements after the new scheme has commenced. This would be reviewed in 2020.

33. We have no plans to review this position as part of the 2016 Target Review.

Allowing movement of Target Units between sectors

34. It is DECC's intention that to avoid "target shopping", the policy that Target Units should not be permitted to move between sectors should continue and there are currently no plans to review this settled position.

Carrying out the Review - roles and responsibilities

35. It is proposed that DECC will take the decisions on which sectors will be selected for detailed review, will propose revised targets based on the evidence, and will be responsible for the process of agreeing new sector commitments. The Environment Agency, as scheme administrator, will conduct the key technical and analytical aspects of the review in support of DECC's decision-making role. This reflects the scheme administrator's in-depth knowledge and their close links with sector associations and their operators.⁹ Changes to Underlying Agreements following cascading of sector commitments via sector associations would fall to the Environment Agency as detailed in the Underlying Agreements.

Funding for the review

36. We are considering the option of recovering the costs of the Review to Government through the charges paid by scheme participants. The Environment Agency is required to consult on charging proposals and take account of responses before making a submission to Government to approve changes to the charging scheme.

Request for comments

37. We would appreciate any comments you may have on any aspect of this paper. We would be willing to speak about these proposals at stakeholder meetings and also to receive feedback in these forums.

Communication and Dissemination

38. This document is available on the gov.uk website. Additionally, we have notified a range of stakeholders known to DECC, and the Environment Agency has included a notification to CCA Scheme participants in its CCA Newsletter. We would be

⁹ Finance Act (2000) provides for the Administrator (Environment Agency) to carry out the Target Review.

happy for this document to be forwarded to any other stakeholder who may have an interest.

Call for evidence

40. The purpose of this call for evidence is to ensure that Government has the latest information on approaches to industrial energy efficiency, including energy management and technological developments, to inform the 2016 Target Review. We are specifically seeking evidence in respect of measures and/or approaches that are applicable to CCA scheme participants. This will help contribute to DECC's evolving evidence base. Government would like to take an inclusive approach and is taking this opportunity to seek the views from as wide a range of stakeholders as possible.
41. As outlined above, DECC's intention for this review is to provide an objective assessment of changes that have occurred on abatement measures and techniques that underpin the current targets since targets were set in 2012. This is to ensure that the targets continue to represent the potential for realistic savings taking account of any changes in management, technical or market circumstances.
42. We would like to share information received in response to this call for evidence more widely within DECC to inform wider Government policy-making on energy efficiency. Please could respondents therefore indicate if they are not content for evidence they submit to be used for other purposes within DECC. We would also share information received with the Environment Agency as Scheme Administrator, and their technical consultants.
43. A list of measures identified in 2012 is set out in Annex C. With reference to this list of measures, we would be grateful to receive evidence on the following in particular:
- 1) What new energy efficiency/carbon reduction technologies and techniques have become available and been deployed to date since target setting in 2012¹⁰?

¹⁰ Included within this, we would be interested in evidence on technologies that may have been just reaching the stage of deployment in 2012 or shortly before. We note that evidence, which might include studies with efficiency data over a year or so, can take time to reach relevant communities and to circulate. We also note that a piece of evidence might have been weak on its own in 2012 and have been excluded, but since 2012, with other supporting information, may form a stronger collective piece of evidence. We would therefore be interested in any evidence that would address these issues.

- what are the energy/carbon savings offered by these interventions within a specified period? e.g. annually, or for a specified number of years following deployment¹¹.
 - what are the capital and operational costs of these interventions and over what period would these costs arise? Please specify which components of costs are treated as capital costs or operational costs and provide a breakdown of costs within these categories if possible.
- 2) Have there been changes in the assessment of energy savings offered by the technologies/techniques available in 2012? Please provide further details on any such changes, including the factors responsible for the change and the likely impact on energy savings as compared to any previous estimates from 2012.
- 3) Have the costs of implementing the technologies/techniques available at 2012 changed in relation to prior expectations? e.g. have costs of any of the technologies or techniques come down more quickly than would have expected in 2012? Please specify the relevant technologies or techniques and indicate the extent to which their costs have changed as compared to any previous estimates from 2012.
44. For all evidence or data provided in response to Questions 1 to 3 above, please specify the sources of the evidence or data and highlight any key assumptions or uncertainties associated with it.
45. We would also be grateful to receive information on any other aspects of changes in industrial energy efficiency potential and opportunities that would be relevant to the Target Review.

¹¹ E.g. a period within the remaining 7 years of the CCA Scheme from 2016 - 2023

Annex A

Sectors and their commitments

Sector	Final Sector Energy Efficiency Improvement Targets (%) for 2020 (from agreed sector baseline)
Aerospace	12.2%
Agricultural Supply	7.5%
Aluminium	2.8%
Bakers	7.0%
Brewers	13.6%
Calcium Carbonate	7.5%
Cement	3.4%
Ceramics	6.1%
Chemicals incorporating Cleveland Potash	11.2%
Compressed Industrial Gases	2.6%
Dairy Industry	13.6%
Egg Processing	20.0%
Eurisol ¹²	10.0%
Food & Drink	18.0%
Food and Drink – Supermarkets	14.0%
Food Storage and Distribution Federation	11.7%
Foundries	3.4%
Geosynthetics	13.4%
Glass & Glass Manipulators	5.0%
Gypsum Products	6.3%
Heat Treatment	18.0%
Horticulture	14.0%
Kaolin and Ball Clay	3.1%
Laundries	25.0%

¹² Eurisol covers producers of mineral insulation material e.g. for loft and cavity wall insulation

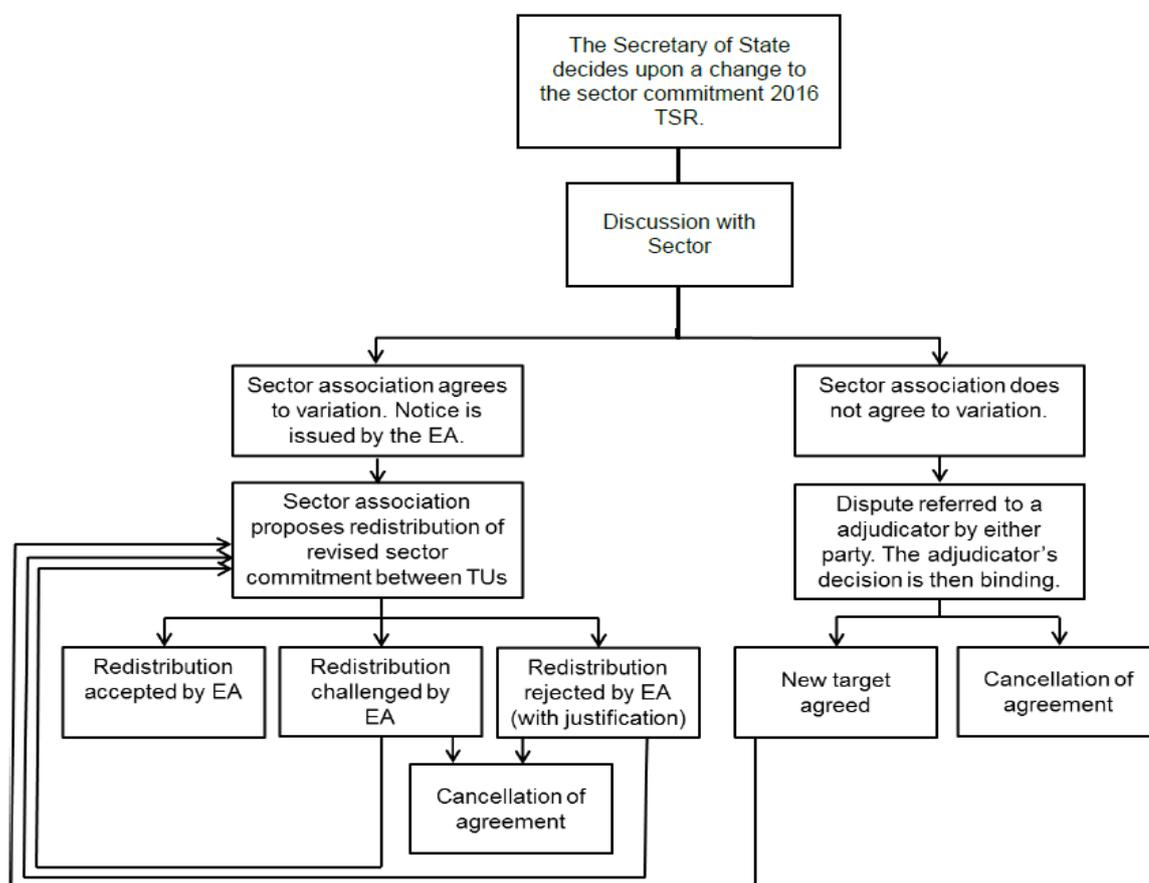
Sector	Final Sector Energy Efficiency Improvement Targets (%) for 2020 (from agreed sector baseline)
Leather	5.3%
Lime	4.0%
Maltsters	4.7%
Meat	15.0%
Metal Forming	6.0%
Metal Packaging	10.0%
Motor Manufacturers	15.0%
NFU Poultry	17.9%
Non-Ferrous	4.4%
Packaging and Industrial Films Association	5.9%
Paper	7.0%
Pigs	22.7%
Plastics	17.0%
Poultry Meat Processing	15.0%
Poultry Meat Rearing	13.0%
Printing	8.4%
Renderers	10.0%
Rubber	10.0%
Sawmilling	6.2%
Semiconductors	12.2%
Slag Grinders	6.3%
Spirits	7.6%
Standalone Datacentres	15.0%
Steel	6.2%
Surface Engineering	15.0%
Textiles - EI ¹³	15.0%
Textiles - IPPC ¹⁴	15.0%
Wall coverings	6.0%
Wood Panel	8.8%

¹³ This sector covers the spinning, weaving and knitting of textiles, but not their dyeing.

¹⁴ This sector covers the upstream wet stages of textile preparation, including dyeing.

Annex B

Process for changing a sector commitment



Notes

Adjudication: The adjudicator can rule on matters of fact only, and the decision is then binding as to that matter of fact. In light of that finding, the Secretary of State and Sector Association would seek to agree the variation. If it cannot be agreed, the agreement can be terminated by the EA.

Redistribution: The redistribution of any revised sector commitment across Target Units is the responsibility of the sector association, who must agree this redistribution with the Environment Agency. The iterative nature of this process is illustrated in the diagram.

Annex C

List of abatement measures identified for 2012 target setting

Energy Management Measures

Energy management in Line with ISO14001

Energy Awareness/Behaviour Change Training

Monitoring and Targeting

More Sub-metering to Allow Better M&T

Benchmarking Between Sites for Best Practice Sharing

Production Scheduling

Planned Preventative Maintenance

Compressed Air - Compressor Maintenance

Compressed Air - Compressor Rationalisation (i.e. have smaller capacity compressor to run as lead to maximise load)

Compressed Air - Air Intake from Colder Source

Compressed Air - Improve maintenance

Compressed Air - Monitoring

Compressed Air - Reduce Leaks

Compressed Air - Optimise/Reduce Pressure

Compressed Air - Turn off when not needed

Compressed Air - Use Motive Power Instead for Compressed Air Where Appropriate (e.g. don't use compressed air to cool but electrically driven fan)

Vacuum - Improved Vacuum Controls

Motors - Maintenance of Motor Drive Belts

Motors - Maintenance of Motors

Motors - Size Correctly for Duty

Boiler - Improved Boiler Control

Boiler - Recalibration of Total Dissolved Solids (TDS) Meters

Boiler - Resizing to Match Demand

Hot Water - Low Pressure Hot Water (LPHW) Settings

Cooling Water - Improved Temperature Control

Cooling Water - Sequence Chillers for Maximum Efficiency

Detect and Rectify Cooling Water Leaks

Factory HVAC - Introduction of BMS

Factory HVAC - Use Natural Ventilation through improved building design

Furnace - Furnace Management Practice

Lighting - Reduce Lighting Levels

Lighting - Switch-off Campaigns

IT Power Saving Computer Software

General Technical Abatement Measures¹⁵

Energy Supply -	Power Factor Correction
Energy Supply -	Install CHP
Energy Supply -	Install CHP with Trigen (trigen where cooling required, via absorption chillers)
Energy Supply -	Install On-site Generation
Energy Supply -	SMART Metering
Energy Supply -	Organic Rankine Cycle Power Generation from Heat Recovery
Energy Supply -	Voltage Reduction
Energy Supply -	Voltage Optimisers
Control -	Occupancy Controls for Lighting and HVAC
Control -	PLC Control of Process
Control -	Install Automatic Cut-off Systems
Motors -	High Efficiency Motors - Upgrade to
Motors -	High Efficiency Motors - Replace IE1 motors with IE2 and IE3 motors
VSDs -	Install on Pumps
VSDs -	Install on Fans
VSDs -	Install on Other Equipment With Variable Loads (e.g. AHUs)
Air Compressors -	Heat Recovery From
Air Compressors -	Replace Existing Compressors with More Efficient Compressors
Air Compressors -	Replace Existing Compressors with Variable Speed Drive Compressors
Boiler -	Oxygen trim
Boiler -	Flue Economiser
Boiler -	Decentralisation of Heat Generation and Distribution
Boiler -	Recover Heat From Boiler Blown-down
Boiler -	Reverse Osmosis for Boiler Feed Water
Steam -	Improve Pipe Lagging
	Condensate Recovery and Reuse
	Rationalisation of Pipework
	Steam Trap Maintenance
	Steam Trap Replacement
	Leak Detection and Repair
Burners -	Fit Recuperative Gas Burners
Burners -	Fit Regenerative Gas Burners
Burners -	Fit Pulsed Firing Burners
Burners -	Fit Digital Control Systems
Burners -	Fit Micro Modulation Control Systems

¹⁵ Measures that are technical and applicable over a large number of sectors (usually meaning that an investment is needed to realise)

Furnace -	Improve/Replace Furnace Insulation
Furnace -	Improved Refractory Technology
Furnace -	Improved Combustion
Furnace -	New Furnace Doors
Furnace -	Heat Recovery for the Generation of Electricity
Cooling -	Replace Existing Chillers with More Efficient Chillers
Cooling -	Replace Vapour Compression Chillers with Air-blast Chillers
Cooling -	Improve/Replace Chiller Water Pipe Lagging
Heat Recovery -	Regenerative Thermal Oxidisers
Heat Recovery -	From Kilns
Product -	Yield Increases
Building -	Fabric Upgrade (i.e. wall and roof insulation and re-roofing)
Building -	Fit Fast Roller Doors
Building -	Sealing to Reduce Heat Losses from Air Leakage
Factory HVAC -	Air Con Efficiency Improvements
Factory HVAC -	Pre-heating of Fresh Inlet Air
Factory HVAC -	Increase Use of Natural Ventilation Through Improved Building Design
Factory HVAC -	Direct Fired Space Heating
Factory HVAC -	Ground Source Heat Pumps
Factory HVAC -	Invest in Higher Efficiency Heaters
Factory HVAC -	Installation of Air Recirculation Fans
Lighting -	Re-lamping with LED
Lighting -	Lighting Optimisers
Lighting -	Fit Lighting Sensors (e.g. Passive Infra-red Occupancy Switches)
Lighting -	Increase Use of Natural Daylight Through Improved Building Design

Sector-Specific Abatement Measures

Abatement and environmental control equipment (e.g. electrostatic precipitator v. bag filter)

Adiabatic cooling on coils

Adjust product formulations (to improve press efficiency)

Airless drying

ASHRAE envelope 2011

Ball mill charge, fit splitter system on inlet to classifier, match grinding roll sizes

Band saw /circular saw - new technology

Body weld - computer controls,

Bottom Stirring/stirring gas

Brewhouse improvements

Bucket elevators twin chain - change to central chain

Centrifugal vacuum exhausters (vs liquid ring pumps) speed controlled to adapt to changes in speed, grammage & felt age.

Chillers – use free cooling coils

Classifier and fan upgrade

Clay dryers optimisation

Clay drying

Clay grinding

Clean in Place (CIP)

Clean in Place (CIP) – installation & optimisation

Coating lines & machine improvements

Co-firing kilns with syngas (Note: a carbon abatement measure not energy reduction)

Cold room - door controls/alarms

Cold rooms/areas improved design

Cold storage improvements

Computer Climate Controls: monitoring and control of relative humidity, temperature, CO₂ levels etc.

Computer to Plate (CTP) as opposed to Computer to Film (CTF)

Cooling water systems

Crop densities increases

Crop schedules reorganisation

Crushing (raw meal) and grinding (clinker) techniques, e.g. vertical roller mill instead of ball mill

Deck ovens - new energy efficient convection ovens

Design and operate redundant air handlers, scrubbers, and cooling tower units in parallel to reduce pressure drop and power requirements, Includes free cooling

DIRECT FIRE ARPS Coating process

Distillation, e.g.: general efficiency, heat integration, sequencing, alternatives to distillation, tray efficiency

Dry transformers replacement with oil filled units

Dryer improvements

Dryer/steam systems: Advanced controls on hoods. Control humidity, maintain balance between hoods and optimise hall ventilation system to minimise air ingress.

Dryer/steam systems: waste heat recovery from hoods (thermal and IR).

Drying / evaporation, eg: general efficiency, heat integration, mechanical de-watering, flow-sheet optimisation

Drying equipment - low temperature

Drying process improvement

Dyeing drums efficiency

Efficient polymer pre-drying technology: Carousel/IR/Other inc heat recovery

Electric melting furnaces

electric robots

Electrical ovens – reduce power loading

Electrolysis, e.g.: membrane for direct production of NaOH, oxygen depolarized cathode technology

Employ direct fired drying

Employ direct fired ovens

Employ more efficient grinding and milling techniques

Energy efficient composites

Energy Efficient Grinders

Energy Efficient Presses

Energy Management (Melting) - Minimisation of post melt holding time - Cast scheduling

Energy Management (Melting) - Minimisation of post melt holding time - Metal Treatment / Preparation and analysis

Energy Management (Melting) - Minimisation of post melt holding time -Melt scheduling

Energy Management (Melting) - Optimisation of melting part of cycle

ESR Furnace - replacement

Evaporative cooling on germination vessels

Extruder - barrel induction heating

Extrusion plant - more efficient

Extrusion plant insulation

Extrusion process: Improve barrel Insulation

Extrusion process: Install new plant

Extrusion process: Use barrel Induction heating

Flash pasteurisation

Forming: process control (moisture profile, temperatures, graduated vacuum); wire fabric choice.

Furnace metal circulation systems

Furnace soft starters

Furnace waste heat recovery

Furnaces / calciners / reactors, e.g.: burners and controls, heat recovery

Gas reduction to pre-heat ladle

Grinding plant optimisation

Grinding technologies improvement

Ground source heat pumps - creep heating

Growing temperature reduction
Heat recovery dehumidification
Heat treatment furnace burners
Heat treatment furnace insulation
Heaters and RF generators - more efficient
Heating reduction in area when birds are young, via use of plastic curtains in sheds
Heating: Controls on creep heating
Heating: Controls on weaner heating
Heating: heat recovery on weaner accommodation
Heating: improvements to building/glasshouse fabric: sealing for air leakage & windbreaks
Heating: thermal screens
Heating: under-floor creep heating
Heating: Use of de-stratification fans to even-out internal temperatures.
High efficiency motors (evaporator and compressor fans).
High efficiency refrigeration compressors.
Homogenisation improvements
Hot/cold aisle containment
Hydro-forming
Induction heaters to preheat work piece prior to forging (rather than pre-heat in furnace)
Industrial gases, e.g.: efficiency, purity requirements, use of byproduct gases, alternative production strategies
Keg and cask processing
Kiln - heat recovery
Kiln - air flow reduction thereby reducing heat loss up the stack
Kiln - direct firing in drying kilns
Kiln - gas to gas heater for instead of boiler
Kiln air recirculation
Kiln burners - high speed
Kiln cars with high U value materials in
Kiln replacement - more energy efficient (new) kilns
Kiln seal system to reduce heat loss through structure and seal
Liquid pumping technology
Materials handling efficiency
Mechanical Vapour Recompression (MVR) - on wash stills only
Metal yield from melting - improve
Milling / micronizing, e.g.: motors and drives, control
Milling equipment – more efficient
Minimisation of water content of feedstock prior to processing eg mechanical de-watering
Mobile plant efficiency
Product - cement composition modification i.e. making less clinker per tonne of cement produced
Molecular sieves
Pasteurisation - milk processing
Pre-cooling of air

Pre-drying of raw material (using waste heat from process)
Press: Extended nips, checking of nip profiling & optimisation crowns.
Process-less plate making
Product - butter and spreads improvements
Product change - Satisfying the external need with less energy intensive product
Product yield (e.g. through improved mould design)
Radiant heat switching
Raw material selection improvement, and stocking of raw material
Raw material/scrap pre-heating
Refractory Technology on furnaces - improved
Refrigeration systems - heat recovery/replacement
Scrap pre-heating
Separation and screening process
Sorting/ separation, crushing technologies improvement
Stirring/mixing/conveyance
Stock Preparation: High consistency pulping. Includes broke systems. Slushing generally uses up to 30 kWh/t [Ref(1)]. Electrical saving 3-8 kWh/t for RCF mills
Stock Preparation: high efficiency screening.
Stock preparation: Optimisation of refining process (mechanical mills only & dispersers
Stock Preparation: tank agitator modifications
Tank insulation and covers
Temperature measurement and temperature control.- improve product accuracy
Thermal oxidiser - reduce air ingress to
Thermal oxidiser controls (used for destroying VOC emissions from wallpaper drying)
Thermal oxidiser heat recovery
Thermal stores/accumulator tanks to meet peak demand
Thermo Vapour Recompression (TVR) - on wash stills only
Timber drying kilns (e.g. insulation on kilns and pipework)
Tunnel pasteurisation
Vacuum systems for energy efficient dewatering.
Ventilation - improve regulation
Venting ducts design improvement (i.e. replace with more efficient curved plastic ducts)
VSDs applied to chilled water pumps
VSDs applied to pasteuriser feed pump
VSDs applied to tank agitators
VSDs on evaporator and condenser fan motors.
Waste reduction – in process
Welding - inverter technology, multi welding units,
Welding machine frequency modulated dc

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