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CHP QA

Principles and Procedures

Pete Edwards
CHPQA

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CHP QA

Talk Coverage

- Quick Review
  - Principles
  - Roles & Responsibilities
  - Certificates
- CHPQA Procedures

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Why CHPQA?

- It is a tool for measuring the Quality of CHP Schemes
- A rigorous system is needed to:
  - ensure that incentives are targeted fairly
  - Ensure that it only benefits schemes making significant environmental savings
- CHPQA provides the methods and procedures needed to assess and certify the quality of the full range of CHP Schemes

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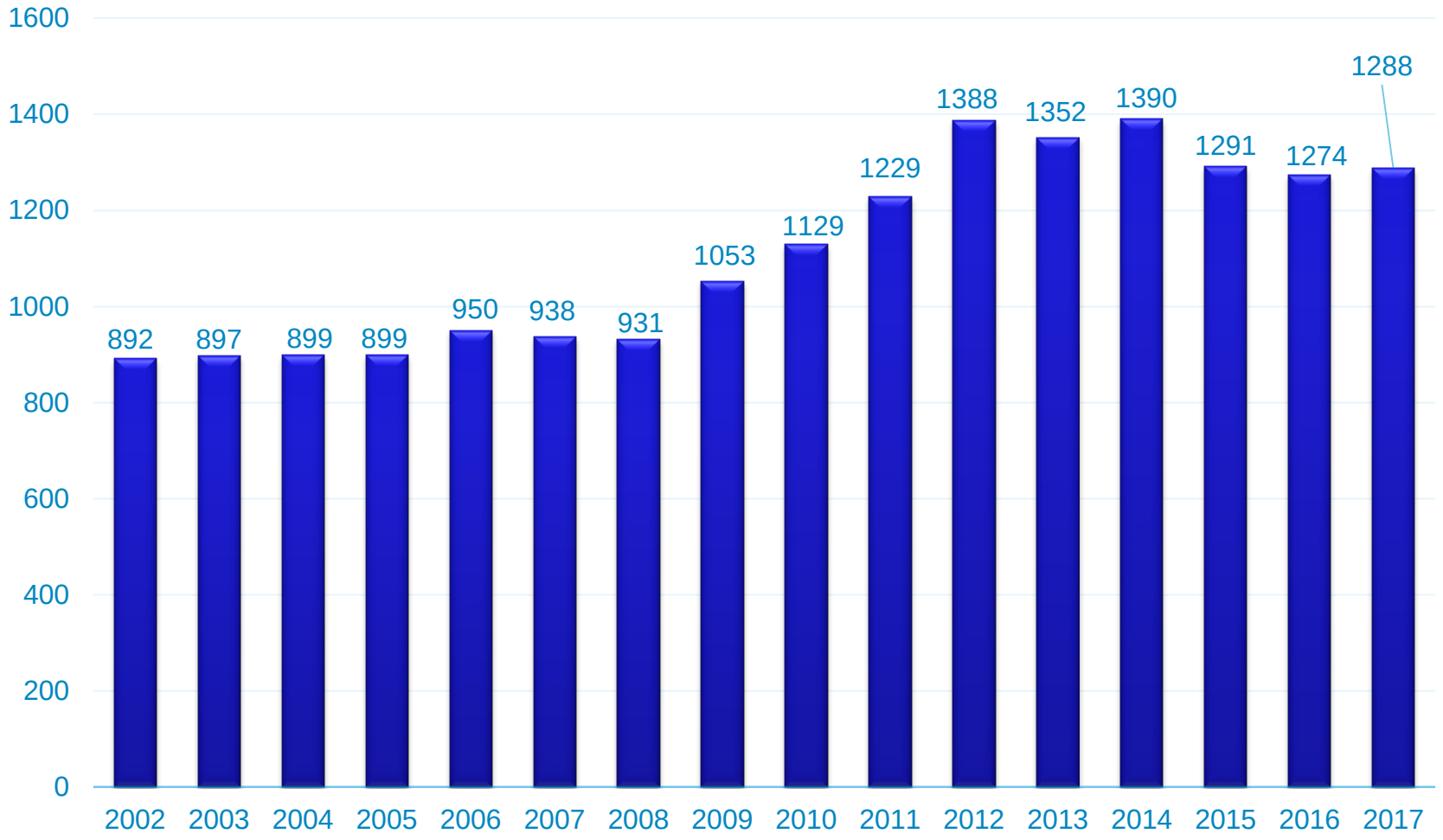
Number of Schemes



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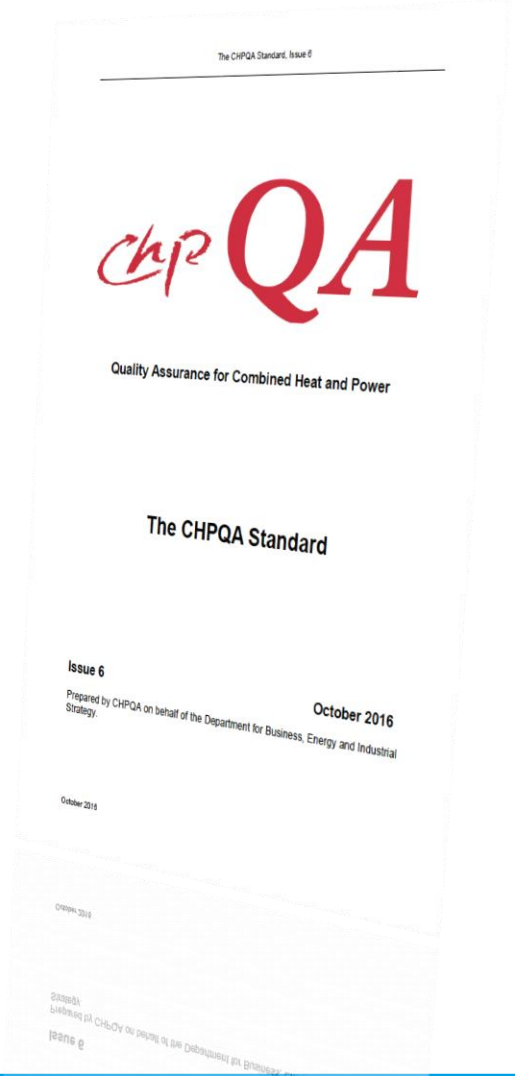
Definition of GQCHP

Set out in the CHPQA Standard

- For Existing Schemes:
  - Quality Index (QI) ≥100 and
  - Power generation efficiency of ≥ 20%
- For Upgraded & New Schemes:
  - Quality Index (QI) ≥105 and
  - Power generation efficiency of ≥ 20%.

See Issue 6 - Published October 2016
See also CHPQA Guidance Note 44 Issue 6 with regard to CFD and ROC support



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CHPQA QI Formulas

The general definition for QI is:

$$QI = (X \times \eta_{power}) + (Y \times \eta_{heat})$$

Where:

Power Efficiency and Heat Efficiency

$$\eta_{Power} = \frac{CHP_{TPO}}{CHP_{TFI}} \qquad \eta_{Heat} = \frac{CHP_{QHO}}{CHP_{TFI}}$$

X and Y are parameters which depend on the type of fuel used and size of scheme (MW_e)

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CHPQA Power Efficiency

- Power efficiency - η_{Power}
- Determined from CHP_{TFI},
  - The measured fuel input, in MWh
  - Includes all fuels consumed by Scheme
  - Covers full calendar year
  - Determined on a GCV (HHV) basis
- And from CHP_{TPO},
  - The measured power output, in MWh
  - Includes all power generated by Scheme
  - Covers full calendar year
  - Not to include load banks

$$\eta_{Power} = \frac{CHP_{TPO}}{CHP_{TFI}}$$

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CHPQA Heat Efficiency

- Heat efficiency – η_{Heat}
- Determined from CHP_{TFI},
  - The measured fuel input, in MWh
  - Includes all fuels consumed by Scheme
  - Covers full calendar year
  - Determined on a GCV (HHV) basis
- And from CHP_{QHO},
  - The measured, useful heat output
  - Covers full calendar year

$$\eta_{Heat} = \frac{CHP_{QHO}}{CHP_{TFI}}$$

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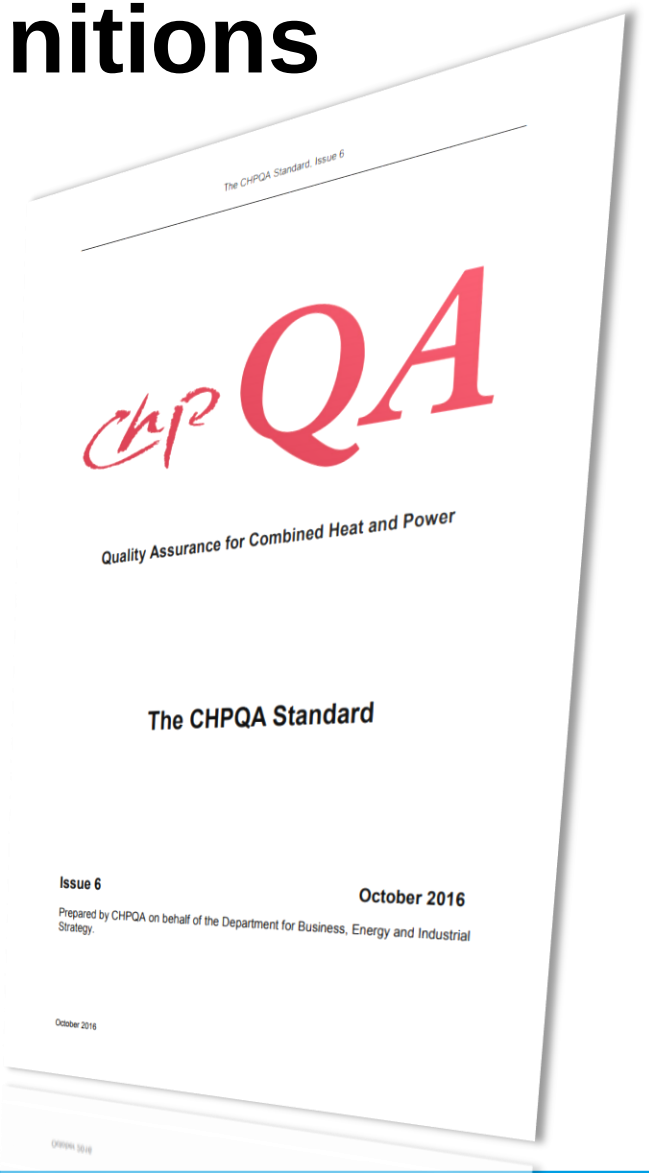
CHPQA X and Y Definitions

- Given in the CHPQA Standard
- Depend on scheme specific fuel type and power capacity
- Full details this afternoon

Size of Scheme (CHP_{TPC})		QI Formula						
CONVENTIONAL FOSSIL FUELS SCHEMES								
Natural gas								
≤1MW$_e$	QI =	249	x	η_{power}	+	113	x	η_{heat}
>1 to ≤10MW$_e$	QI =	195	x	η_{power}	+	113	x	η_{heat}
>10 to ≤25MW$_e$	QI =	191	x	η_{power}	+	113	x	η_{heat}
>25 to ≤50MW$_e$	QI =	186	x	η_{power}	+	113	x	η_{heat}
>50 to ≤100MW$_e$	QI =	179	x	η_{power}	+	113	x	η_{heat}
>100 to ≤200MW$_e$	QI =	176	x	η_{power}	+	113	x	η_{heat}
>200 to ≤500MW$_e$	QI =	173	x	η_{power}	+	113	x	η_{heat}
>500MW$_e$	QI =	172	x	η_{power}	+	113	x	η_{heat}
Oil								
≤1MWe	QI =	249	x	η_{power}	+	115	x	η_{heat}
>1 to ≤25MWe	QI =	191	x	η_{power}	+	115	x	η_{heat}
>25MWe	QI =	176	x	η_{power}	+	115	x	η_{heat}
Coal								
≤1MWe	QI =	249	x	η_{power}	+	115	x	η_{heat}
>1 to ≤25MWe	QI =	191	x	η_{power}	+	115	x	η_{heat}
>25MWe	QI =	176	x	η_{power}	+	115	x	η_{heat}



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Definition of ‘Useful Heat’

- ‘Useful Heat’ is defined as the heat from a CHP scheme delivered to satisfy an **economically-justifiable** demand for heat or cooling
  - (Article 3 of the Cogeneration Directive, Article 2 of the EED);
- Demand which does not exceed the needs for heating or cooling, and which
- Otherwise would be met at market conditions by energy generation processes other than cogeneration.

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Examples of 'Useful Heat' loads

- CHP heat used for space heating, hot water and process heat
- CHP heat replacing an existing heat demand
- CHP heat used to meet legislative requirements

Do not require economic justification, only evidence of demand

- CHP heat used to meet unusual heat loads (e.g. woodchip / wood pellet drying, AD plant heat load)
  - requires economic justification

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Basis of Economic Analysis

- Should be undertaken for the alternative to CHP (i.e. assuming that CHP does not exist)
- Heat is only provided through a gas or an oil boiler
- Any fiscal benefits or revenue from CHP will thus be excluded from the cost-benefit analysis
- Analysis can be undertaken in a spreadsheet or in the form of a detailed report
- All assumptions must be fully stated and referenced (*for example size of market and corresponding size of heat demand need to be evidenced with suitable market study*)
- Calculations must be fully shown (calculation of costs, revenues, and payback period)

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Requirements for CHPQA Economic Justification

- Full description of the business case for the heat load
- A cost-benefit analysis involving:
  - the capital cost of the heat source (i.e. gas boiler)
  - the operating costs (e.g. cost of fuel to run the boiler)
  - the revenue/benefit achieved by utilising the heat
  - a statement of the Company's investment criteria stating what is considered an acceptable payback period.

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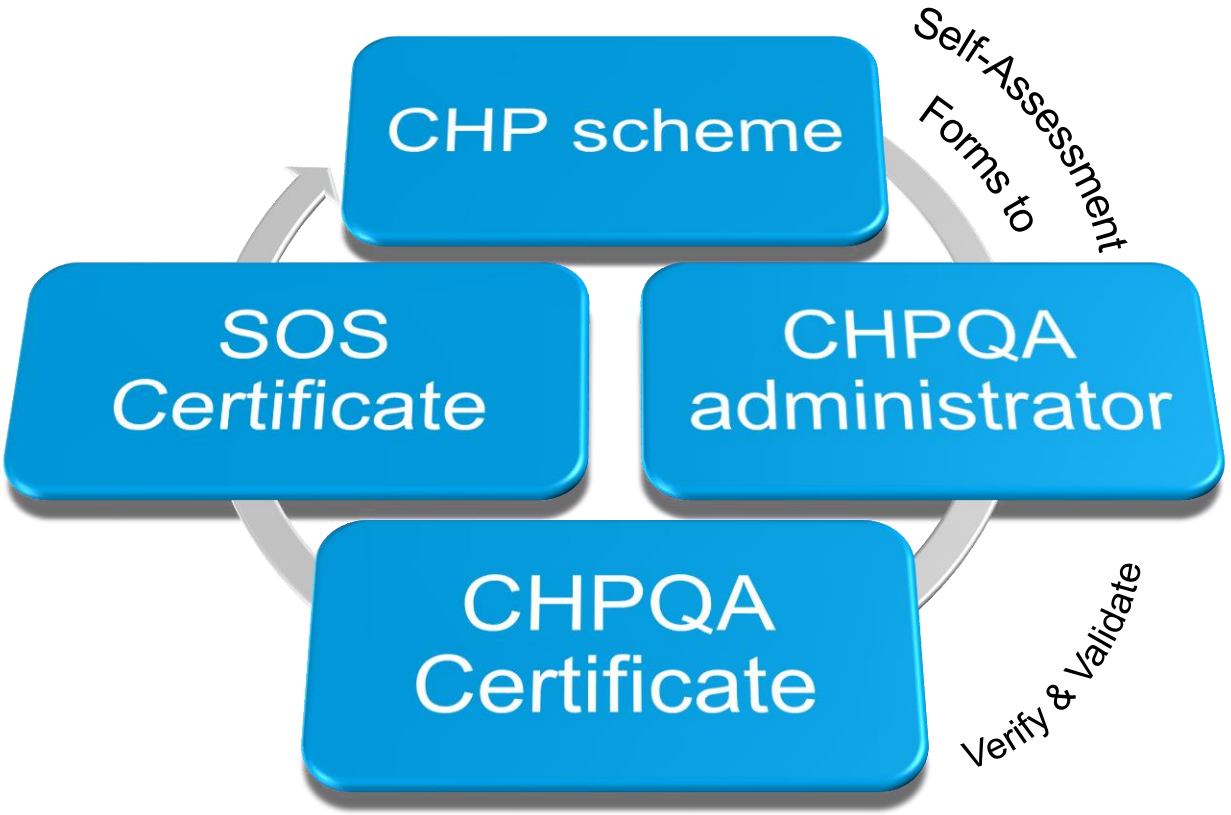
Self Assessment & Certification



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Roles & Responsibilities

- CHPQA Administrator
  - Managed by Ricardo Energy & Environment

RICARDO

- Department for Business, Energy & Industrial Strategy (BEIS)
- Other Government Departments (HMRC, VOA)

HM Revenue & Customs

Valuation Office Agency

- Ofgem
  - for RHI and ROCs

ofgem

- Low Carbon Contracts Company
  - for CfD contracts.

LOW CARBON CONTRACTS COMPANY

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CHPQA Guidance Notes

- Range of Guidance Notes available on the CHPQA web site
- Always refer to the web site to be sure of latest version
- Five broad areas
  - 0-9 Introduction & Forms
  - 10-16 Scheme Details & Thresholds
  - 17-29 CHPQA Analysis
  - 30-39 Treatment of Special Cases
  - 40-49 Uses for CHPQA

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CHPQA Guidance Notes

- Of particular interest;
  - 11 and 12 – Defining & Describing the Scheme
  - 13 – Scheme Monitoring
  - 14, 15 and 16 – Fuel, Power and Heat Metering
  - 17, 18 and 19 – Metering/Monitoring Uncertainty

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CHPQA Submission

- A range of forms:
  - F1 (contact details);
  - F3 (scheme predicted performance for new and upgraded schemes).
  - F2 (scheme description); and
  - F4 (scheme actual performance in previous calendar year).
- Simplified procedure and forms for small single reciprocating engine based schemes (<2MW_e).
  - Only have to provide three figures per year.

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CHPQA Forms

- CHPQA Forms to be submitted:
  - **F1**...only if RP or company name has changed
  - **F2 and F2(S)..**only if Scheme boundaries or monitoring arrangement have changed
  - **F4 & F4(S)** annual submission using actual performance data
  - **F3 & F3(S)** annual submission using design data. If no change …. Submit the same form… Once a new or upgraded Scheme has at least 1 month of data in CHP mode, Form F4 or F4(S) must be submitted in the first January of Initial Operation.

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Initial Operation

- Initial Operation ends after the first full calendar year of operation
- Scheme commences operation in June 2016
- IO period ends 31 December 2017
- QI Threshold during IO is 95

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Short Forms for <2MWe CHP Schemes

- Schemes eligible to use short forms:
  - Reciprocating Engine Prime Mover
  - Less than 2MW_e Total Power Capacity
  - Only a single conventional fuel
  - Only include a single prime mover,
  - No heat only boilers

- F2(S) > 2 pages
- F3(S) > 4 pages
- F4(S) > 4 pages

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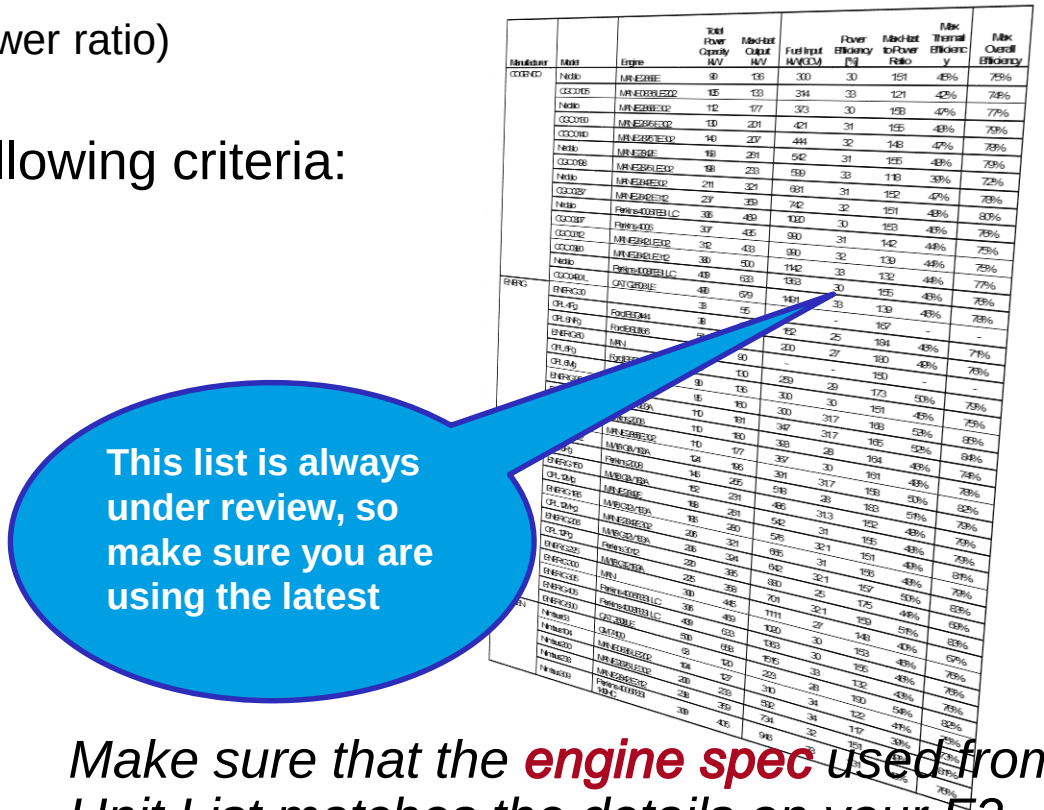
Simplification for <500kWe Schemes

Simple small CHP schemes can use the CHPQA Unit List to determine:

- Gas input (based on power efficiency) and
- Heat output (based on heat-to-power ratio)

Only CHP units meeting the following criteria:

- CHP Scheme with TPC <500kWe
- Only include a single prime mover
- Using Natural Gas fired engines
- No facility to dump heat



This list is always under review, so make sure you are using the latest

*Make sure that the **engine spec** used from Unit List matches the details on your F2*

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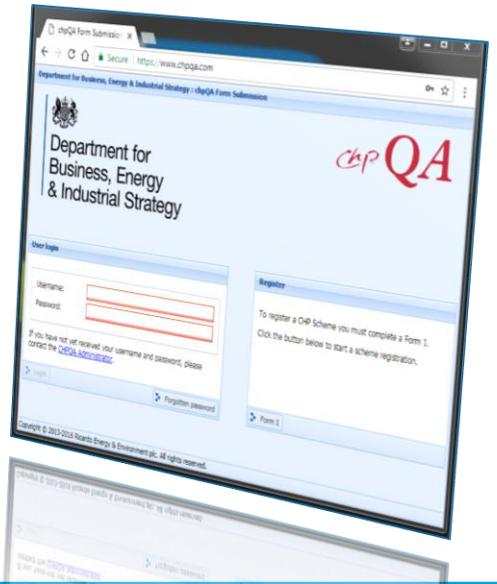
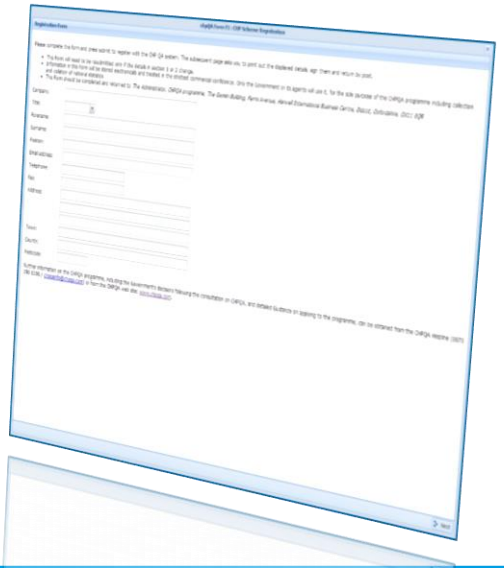
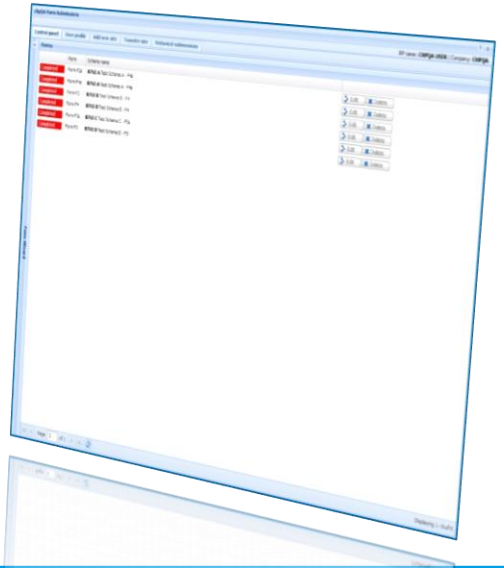
CHPQA Submission

- Electronic submission is now used for more than 98% of all submissions.
- It is our intention to migrate to a fully paperless system starting with next years submissions.







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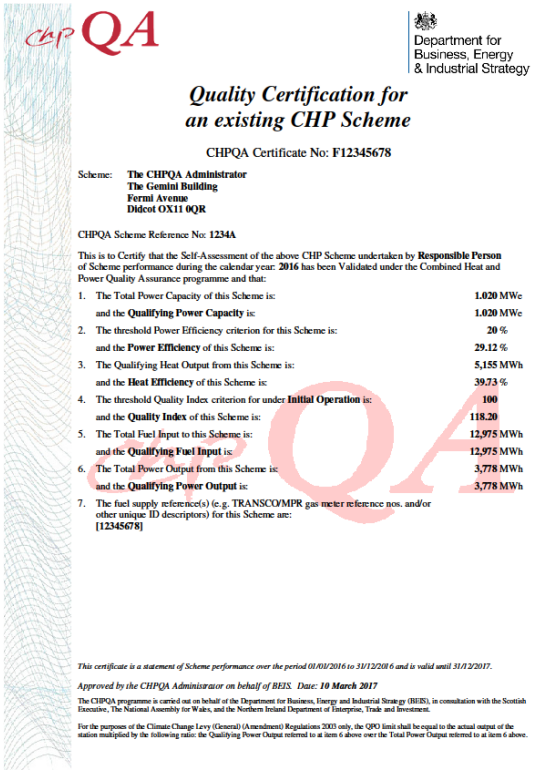
Certification Timetable

- CHPQA Certificates cover a **calendar year** and expire at the end of December
- SoS (CHP Exemption) certificates are **open-ended…**
- …provided that a valid CHPQA certificate is obtained **no later than end of June every year**
- ***To obtain an SoS certificate need to make sure you select the correct option***



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Quality Certification for an existing CHP Scheme

CHPQA Certificate No: **F12345678**

Scheme: **The CHPQA Administrator**
The Gemini Building
Fermi Avenue
Didcot OX11 0QR

CHPQA Scheme Reference No: **1234A**

This is to Certify that the Self-Assessment of the above CHP Scheme undertaken by **Responsible Person** of Scheme performance during the calendar year: **2016** has been Validated under the Combined Heat and Power Quality Assurance programme and that:

1.	The Total Power Capacity of this Scheme is:	**1.020** MWe
	and the **Qualifying Power Capacity** is:	**1.020** MWe
2.	The threshold Power Efficiency criterion for this Scheme is:	**20** %
	and the **Power Efficiency** of this Scheme is:	**29.12** %
3.	The Qualifying Heat Output from this Scheme is:	**5,155** MWh
	and the **Heat Efficiency** of this Scheme is:	**39.73** %
4.	The threshold Quality Index criterion for under **Initial Operation** is:	**100**
	and the **Quality Index** of this Scheme is:	**118.20**
5.	The Total Fuel Input to this Scheme is:	**12,975** MWh
	and the **Qualifying Fuel Input** is:	**12,975** MWh
6.	The Total Power Output from this Scheme is:	**3,778** MWh
	and the **Qualifying Power Output** is:	**3,778** MWh

7. The fuel supply reference(s) (e.g. TRANSCO/MPR gas meter reference nos. and/or other unique ID descriptors) for this Scheme are:
[12345678]

This certificate is a statement of Scheme performance over the period 01/01/2016 to 31/12/2016 and is valid until 31/12/2017.

Approved by the CHPQA Administrator on behalf of BEIS. Date: ***10 March 2017***

The CHPQA programme is carried out on behalf of the Department for Business, Energy and Industrial Strategy (BEIS), in consultation with the Scottish Executive, The National Assembly for Wales, and the Northern Ireland Department of Enterprise, Trade and Investment.

For the purposes of the Climate Change Levy (General) (Amendment) Regulations 2003 only, the QPO limit shall be equal to the actual output of the station multiplied by the following ratio: the Qualifying Power Output referred to at item 6 above over the Total Power Output referred to at item 6 above.

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Audits

- All Schemes are potentially subject to Audit
- Usually performed in autumn of each year
- Look to audit approximately 75 Schemes a year, and larger Schemes every three years
- Selected during validation

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Audits

- I have received an audit notification. What happens at an audit?
  - CHPQA consultant will attend site on the confirmed date.
  - If small scheme, first activity will be a quick set of meter readings (fuel, power and heat)
  - All schemes, two main aspects to audit
    - Desk based audit
    - Site walkdown

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Audits

- Audit (cont)
  - Desk audit will review submitted forms – F1, F2 and previous years F4 – against the records held by the RP, so make sure you have records to hand
  - Site walk-down will require access to CHP, all equipment and monitoring arrangements.
  - Small schemes 1-2h, large schemes 3-5h
  - Summary of Observations & Actions will follow, with date for completion of actions.
  - CHPQA cannot validate schemes where actions are not closed.

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Where do you go from here?

- All CHPQA Certificates issued in 2017 will expire on 31st of December 2017
- **New self-assessments should be submitted to the CHPQA Administrator before end of March 2018**
- **Based on 2017 actual data:**
  - Fuel used
  - Electricity generated
  - Heat utilised (actual)

- **If all is in order new certificate (based on 2017 data) will be issued before the end of June 2018**

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CHPQA Contact Details

CHPQA Administrator

The Gemini Building
Fermi Avenue
Harwell
Didcot
OX11 0QR

E-mail: **chpqainfo@chpqa.com**

Tel: 01235 75 3004

Web:

https://www.gov.uk/combined-heat-power-quality-assurance-programme