What is it?

Boiler Controls are specifically designed equipment that maximise the efficiency of new and/or existing boiler and burner plant.

Boiler Controls equipment is considered to include the following:

**Oxygen Trim Controls**

Oxygen trim controls automatically monitor the oxygen or carbon monoxide concentration in boiler flue gases and vary the air/fuel supply to the burner to limit excess or low oxygen concentrations in the fuel/air mix.

**Burner Systems**

Burner systems are designed to provide boiler modulation and combustion control through the use of digital microprocessor based systems with the aim of optimising energy use. New burners with controls or retrofit burner control systems can be fitted.

**Sequencers**

Boiler sequencer controls optimise fuel usage by managing the firing sequence of different boilers to ensure that the most efficient boiler(s) are selected to match the prevailing load conditions.

**Metering**

Energy meters can track boiler performance and report boiler system energy consumption to the user.

How does it work?

**Oxygen Trim Controls**

Oxygen trim controls are a means of controlling air: fuel ratio on a real time basis. The system uses an in situ oxygen probe with an electronic analyser/controller. Together they provide a control output to the air or fuel controller. The probe is mounted at a representative position in the flue gas path. Care must be taken to ensure that the probe is sited well away from the burner flame paths. The probe is connected to the analyser which calculates the oxygen concentration in the flue gases. The control output is passed to a signal limiter containing the desired set point and then to a ratio controller that operates a motorised valve on the fuel line and motorised damper on the air intake to maintain the desired ratio.

**Burner Systems**

Burner systems continuously measure either the temperature or pressure in the heating system and modulate the burner to match the measured demand, adjusting the burner from firing at 100% down to 40 - 50% for oil burners and down to 25% for gas burners. The system will also measure the oxygen and carbon monoxide levels in the flue gasses and adjust the air: fuel ratio to maintain preset levels. The system achieves this control through servo actuators connected to all appropriate valves and dampers on the burner and also through variable speed drives (VSD) on the burner fan.
Sequencers
Boiler sequencer control systems are microprocessor based systems which measure the heating system flow and return temperatures and then isolate or control multiple boilers to ensure that the most efficient boiler(s) are selected to match the prevailing load conditions. The control system stores and references the control parameters of each individual boiler and uses this data to optimise the firing sequence.

![Diagram of Metering System](image.png)

Metering
Energy metering systems are microprocessor based systems which measure the appropriate boiler parameters (Flow, temperature, pressure, fuel consumption) and then calculate the associated energy usage. This information is displayed on a local panel and can be logged to a Building Management System (BMS) thus can track boiler performance and report boiler system efficiency to the user.

What are the energy saving benefits?
Installing energy efficient technologies on an existing standard boiler installation is a means of improving boiler performance without having to replace the entire boiler or burner. Improving boiler controls is often a cost effective means of reducing energy consumption.

Once installed, a boiler control unit consumes very little energy. Thus the running costs of boiler controls are minimal, except where specific maintenance schedules are required to maintain correct operation.

Typical Energy savings for each of the technologies are listed below:

**Oxygen Trim**
- 2 – 5% reduction in fuel costs
- Typical payback periods 1 - 4 years
- Reduced carbon emissions

**Burner Systems**
- 25-40% reduction in fuel costs
- Typical payback periods 2 - 4 years
- Reduced carbon emissions

**Sequencers**
- 12-15% reduction in fuel costs
- Typical payback periods 2 - 4 years
- Reduced carbon emissions

**Metering**
- 2 - 5% reduction in fuel costs, higher when used in conjunction with other technologies
- Typical payback periods 1 - 4 years
- Reduced carbon emissions

Considerations when selecting an energy efficient product from this technology category include:

**Oxygen Trim**
- Not suited to small boiler installations, large energy users can derive the most benefit from this technology (typically over 500 kW)
- Once installed the system requires regular maintenance, particularly the oxygen sensor which may require replacement at 6 monthly intervals.

**Burner Controls**
- The burners need to be suitable for modulated control. Some burners are simple OFF/ON or OFF/LO/HI. The latter does offer some scope for savings.
- The heating load must be variable; some loads are constant and as such would derive no benefit from modulating control.

**Sequencer**
- Sequencers can only be used where a system has multiple boilers (at least two).
- Can be implemented and provide benefits with OFF/ON or OFF/LO/HI burners.

**Metering**
- Metering provides a relatively low cost method of monitoring a boiler’s performance. It does not modify or adjust the operation of the system, but provides the data needed for informed decision making with regard to implementing energy saving measures. Metering also quantifies improvements or reductions in boiler energy performance, resulting from actions taken.
- Training may be required to correctly analyse the data from the meters installed.

Energy Efficient Boiler Controls are eligible for the ACA (Accelerated Capital Allowance) and on the Triple E product register. More details can be found at [www.seai.ie/Your_Business/Triple_E_Product_Register/](http://www.seai.ie/Your_Business/Triple_E_Product_Register/)