

**Project:**  
Clyde Windfarm

**Location:**  
South Lanarkshire, Scotland

**Project completed:**  
2011

**Owner/s:**  
Scottish and Southern Energy

**Applicator/Contractor:**  
CRL

**Designer/Architect/Specifier:**  
Scottish and Southern Energy

**Market sector:**  
Energy

**Products used & amounts:**  
MasterFlow 9300 ExagROUT  
120 tons

## Clyde Wind Farm

### Performance grout for tower foundations



Our reference in South Lanarkshire (United Kingdom): Clyde Wind Farm

#### The background

Consent for the 152-turbine Clyde Wind Farm covering 47 square kilometres was granted by Scottish Ministers in July 2008, with construction commencing in April 2009.

At the peak of construction around 400 people were employed on the site. Clyde's location presented many engineering challenges, including the need to carry out low temperature winter working. The £600 million project, capable of powering 200,000 homes, was split into three sections – Clyde South, North and Central – and completed on target in 2012.

#### The challenge

Each of the Siemens 2.3MW turbines is based on a reinforced concrete foundation, each of which typically comprises approximately 350m<sup>3</sup> of concrete with 55 tons of steel reinforcement.

During their lifetime wind turbine installations are exposed to millions of dynamic loads caused by wind actions and the rotation of the rotor blades. Additionally, these giant structures weighing of several hundred tons also create large axial loads on the foundations. The most important loads acting on a wind turbine structure are: axial load, vibration, rotation, bending and torsion. All these loads need to be transferred/absorbed by the grout connecting the tower to the foundation structure

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## Performance grout for tower foundations



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### Our solution

MasterFlow 9300 ExagROUT ultra high strength, fatigue resistant cement grout with metallic aggregates was selected to form the structural connection between the wind turbine and concrete gravity foundation. MasterFlow 9300 ExagROUT was selected because of its proven fatigue resistance, excellent long term durability and its ability to be used in harsh weather conditions and temperature ranging from as low as + 2°C.

### The customer's benefit

Installation of the MasterFlow 9300 ExagROUT was carried out by Master Builders Solutions' licensed contractor CRL at temperatures of down to +2°C, with a rapid strength build-up and high ultimate strengths allowing a short overall installation time.

- Earlier operation of the wind farm
- Secure, maintenance-free installation thereby significantly contributing to overall project efficiency

### Projects facts at a glance

- Number of turbines: 152 x Siemens 2.3MW
- Windfarm total capacity: 389MW
- Homes equivalent: 300,000
- CO2 reduced per year 43586 tonnes
- Turbine hub height of 80m
- Blade diameter of approximately 90m.
- Area of the wind farm: 47 km<sup>2</sup>
- Construction period: 2009-12
- Foundation type: concrete gravity foundation
- MasterFlow 9300: 120 tonsFact

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