

# Callaghan Engineering

Consulting Engineers Project Managers




## Datacentre Capability

March 2015

# Callaghan Engineering

- Multi-discipline engineering & project management company
  - Established in 1990
  - Offices in Dublin and Cork, Ireland
  - Provide a High Quality, Personalised, Flexible, Professional and Competitive Service to our clients
  - Excellent Client Relationships - Repeat Business
  - Markets: Datacentres, Biopharmaceuticals, Education, Commercial, Healthcare, Food/Drink, Consultancy
  - Currently designing projects in Germany & Netherlands
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# Callaghan Engineering

- Project Scope
    - Take project from concept through to completion
    - Masterplanning - Front End Studies
    - Detailed Design
    - Project & Construction Management
    - Procurement
  - Project Services
    - M&E Engineering
    - Fire Protection
    - ICT
    - Commissioning & IST
    - PSDP & PSCS
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# Callaghan Engineering

## Datacentre Experience

**Confidential Client, Dublin**

\$1 Billion Data Centre Investment Programme through 2016 - 8 Datacentres  
(59 datahalls when complete) – Ireland & Germany

	Location	No. of Datahalls	Area per hall m2	Power per hall MW	Total critical power MW
1	Clonshaugh	2	1145	1.2	2.4
2	Blanchardstown	8	883	2.4	19.2
3	Tallaght	9	944	3	27
4	Clonshaugh	6	800	2.4	14.4
5	Clonshaugh	9	822	2.4	21.6
6	Clonshaugh	3	708	2.4	7.2
7	Blanchardstown	10	861	2.4	24
8	Frankfurt	12	850	2.4	28.8
	Total on completion	59			144.6


# Datacentre Experience Overview

## Callaghan Engineering DC experience to date:


- 32 Datahalls constructed and handed over
- Services Provided:
  - Full M+E design
  - Masterplanning
  - Shell & Core
  - Datahalls
  - Project Management
  - Procurement
  - FATs/SATs
  - Commissioning/ Handovers
- Datahall build value approx. €10-12m each
- Aggressive, changing timelines – always met handover dates
- Design and integration of 3 no. 110kV substations




# DC Electrical Systems

- Incoming 110kV Utility supply to transformer switchyard
  - Client 20kV/25mVA Metering & protection building
  - 20kV dual feeders to clients MV substation boards
  - MV substation dual feeds to Data Halls. Unit Subs. 2.4/3.0mVA
  - MV substation feed to standby Unit Sub. 2.4/3.0mVA.
  - Data Halls standby automatic start generators 400V 50Hz 2.5mVA.
  - Critical Distribution Boards, 400V 50Hz incorporating inline UPS & Master static switches. Typical autonomy of 10 Minutes at full load
  - Data Hall power distribution panels feeding rack distribution units
  - Data Racks Power distribution boards, 400V 50Hz dual sided incorporating Automatic Transfer Switches
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# DC Electrical Systems


- Cabling & Busduct power distribution systems. 400V 50Hz 2000/4000A
  - Power distribution boards for mechanical cooling & air conditioning
  - House services distribution boards with dual supplies
  - Building Management System for control and monitoring of facility, environmental conditions and power energy meters
  - Lighting, Small Power, Fire Alarm, Security and Access controls
  - Main building lightning protection and earthing, site lighting, offices & storage fit-out
  - Diesel storage tank farm. Distribution, pumping and valving to emergency generators and fire water pumps
  - Water storage, treatment and distribution system for AHU free cooling
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# DC Mechanical Systems

- **Datacentre Ventilation systems** (2 concepts have been used - AHU & CRAHs)
    - AHU forced ventilation
      - Air distributed in floor void
      - High level extract ducting to AHU return fans
    - CRAH forced ventilation
      - Cold corridor fresh air intake
      - Air distributed in floor void
      - Roof level extract fans
      - Mixing box for air recirculation
  - Hot or Cold aisle containment regimes used
  - Datahall/electrical room extract fans
  - Battery rooms DX systems + extract system
  - BMS control of all mechanical plant to maximise free cooling and minimise PUE
  - Office M&E systems
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# DC Mechanical Systems

- **Fire Protection**
    - Pumphouse and tanks layout
    - Pre-action and wet systems
    - Interface with BMS and security
    - Vortex system for MV rooms
  - **Diesel Systems**
    - 24 hr storage vessels including containment bund to EPA requirements
    - Underground distribution main & distribution pumps
    - Supply to individual generators (containerised or skid mounted sets)
    - Environmental monitoring of system and all bunding to BMS
  - **Humidifier water**
    - Humidifier water tanks, pumphouse and distribution system, including water treatment and recirculation
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# DC Security Systems

- **External Security Systems**

- Closed Circuit Television.
- Perimeter Detection.
- Voice Alert Perimeter Alarms.
- Vehicular and Pedestrian Access Control – Automatic Gates and Traffic Barriers.

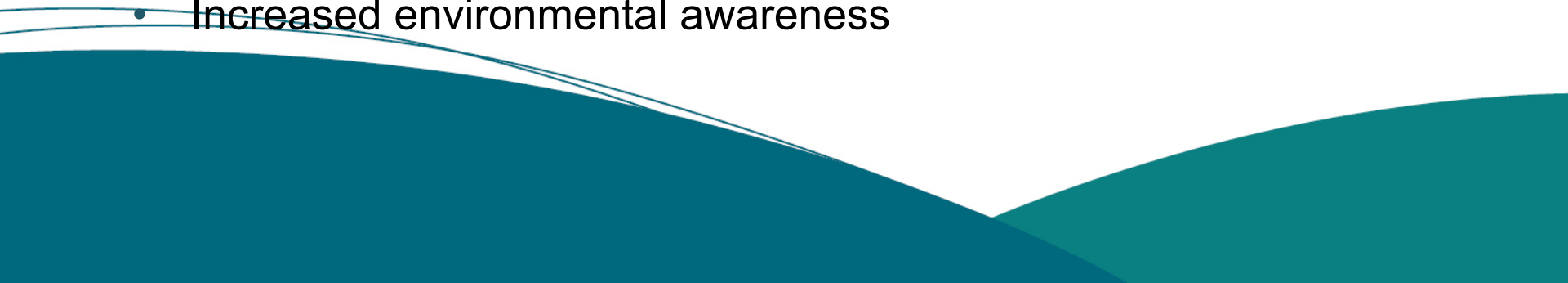
- **Internal Security Systems**

- Pedestrian Access Control.
- Closed Circuit Television.
- Pedestrian Metal Detection.
- Intercoms.
- Monitoring of Exit Doors.
- Centralised Monitoring of External and Internal Areas.


- **Fire Alarm & Detection Installation Design**

- Very Early Smoke Detection Alarm (VESDA) in Electrical Rooms and Data Halls.
- Hydrogen Gas Detection in Battery Rooms.
- Fire Alarm System Interface with Other Systems – BMS, Security, Sprinkler, Gas Detection etc.
- Centralised Monitoring via Front End Graphics.

# Industry Trends

- Mechanical DX Cooling ► Free Cooling ► CRAHs
  - Raised floors ► Racks on slab (air contained in hot aisle)
  - Energy Monitoring
    - BMS (High level) ► dedicated system monitoring to each rack
  - Temperature monitoring
    - Aisle temp sensor ► now monitoring each server
  - Datahall size increasing ► Ballroom 2.4-7.5 MW
  - Increased security - Physical and Virtual
  - Increased environmental awareness
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# Why Callaghan Engineering?

- Proven capability of delivering datacentre projects
  - Reputable Engineering Consultancy – established 25 years
  - Fully aware of confidentiality requirements
  - Depth of resources with relevant experience
  - Competitive, flexible, reliable service offered
  - Innovative solutions drawn from broad breadth of experience
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# Callaghan Engineering

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