C&F Green Energy

C.F

The *Best* Wind Turbines in the World

DESIGNED AND MANUFACTURED IN IRELAND

Generator

Designed and built at C&F in Athenry, Co. Galway Ireland. This axial flux permanent magnet air cooled multiple generator will give a lifetime of efficient, trouble-free electrical production.

This is achieved through multi plate axial configuration which also facilities modular construction with multiple independent outputs. This feature gives us the ability to design turbines to specific customer needs.

Blade Pitch Control (Pitch Actuator)

The blades are automatically controlled to optimise aerodynamic performance under different operating conditions. Bigger blades give more power but demand a more sophisticated control mechanism. C&F have adopted mega turbine pitch control technology, giving us perfect control over each model.

This guarantees power production at the lowest wind speed as well as at the highest wind speeds. The overall result is the most efficient micro turbine available in the world today.

Wind Vane Cup Anemometer

(Yaw Actuator)

A wind direction vane is monitored by the turbine microprocessor which then activates the yaw motor to align the turbine into the wind. This feature, usually employed on large turbines, improves performance and energy yield.

Electro Mechanical Brake

An electro mechanical brake is employed as a failsafe back-up to the blade pitch brake. This is an essential safety feature usually employed on large turbines and it acts in such a way that the brake automatically engages should a fault be detected.

Blades

Our blades are manufactured from aerospace type composite materials which are stronger than steel. The CF6/11 turbines use carbon fibre reinforced polypropylene while the larger machines use glass fibre reinforced vinyl ester.

Mast

All C&F turbines employ a monopole mast which can withstand hurricane force winds. The mast is erected using a hydraulic ram which enhances operator safety and facilitates ongoing safety.



CsF C

Controller/GSM

C&F have developed their own microprocessor to control their range of turbines. The microprocessor is GSM enabled allowing the machine to be remotely monitored and controlled over the internet or even by mobile phone. This facility allows us to monitor your turbine and ensure that it is operating to its full potential at all times. This provides the customer with peace of mind that their investment is continuously working for them.



Connection Options (Grid Tie or Off Grid Connections)

We offer a complete hybrid solution including backup DC power, battery storage and control systems.



CARBON CREDITS

Leading the way in the green energy field, C&F Green Energy is currently establishing a carbon credits system for its customers. Once your turbine has been installed, the turbines output will be monitored on an ongoing basis. C&F will then issue the customer with an accredited certificate detailing the carbon credits produced each year. This can, in turn, be offset against a carbon tax.

Rotor Diameter	6 m	
Tower	10 m Monopole	
Max. Power	6 kW	
An. Yield @ 5 m/s av.	11,300 kWh	
Rated Wind Speed	9 .5 m/s	
Min active wind speed	1.2 m/s	
Cut out wind speed	NONE	
Annual Carbon Savings	8 - 14 Tonnes	
Noise @ 5 m/s at 60m	40dBA	
Rated RPM	220 rpm	
Method of Installation	Hydraulic Tilt Installation	
GSM CONTROLLED AS STANDARD		
Annual Average	Annual	
	Allilual	
Wind Speed in m/s	Yield kWh	
Wind Speed in m/s 4.5	Yield kWh 8,670	
Wind Speed in m/s 4.5 5	Yield kWh 8,670 11,290	
Wind Speed in m/s 4.5 5 5.5	Yield kWh 8,670 11,290 13,978	
Wind Speed in m/s 4.5 5 5.5 6	Amman Wield KWh 8,670 11,290 13,978 16,570	
Wind Speed in m/s 4.5 5 5.5 6 6 6.5	Amman Wield KWh 8,670 11,290 13,978 16,570 18,932	
Wind Speed in m/s 4.5 5 5.5 6 6.5 7	Amman Wield KWh 8,670 11,290 13,978 16,570 18,932 20,969	



Single Phase

SPECIFICATION SHEET

Rotor Diameter	8 m
Tower	15 m Monopole
Max. Power	6 kW
An. Yield @ 5 m/s av.	17,000 kWh
Rated Wind Speed	8.0 m/s
Min active wind speed	1.2 m/s
Cut out wind speed	NONE
Annual Carbon Savings	8 - 14 Tonnes
Noise @ 5 m/s at 60m	42 dBA
Rated RPM	220 rpm
Method of Installation	Hydraulic Tilt Installation
GSM CONTROL	LED AS STANDARD
GSM CONTROL	LED AS STANDARD Annual
GSM CONTROL Annual Average Wind Speed in m/s	LED AS STANDARD Annual Yield kWh
GSM CONTROLI Annual Average Wind Speed in m/s 4.5	LED AS STANDARD Annual Yield kWh 13,761
GSM CONTROL Annual Average Wind Speed in m/s 4.5 5	LED AS STANDARD Annual Yield kWh 13,761 17,065
GSM CONTROL Annual Average Wind Speed in m/s 4.5 5 5.5	Annual Yield kWh 13,761 17,065 20,188 20,188
GSM CONTROL Annual Average Wind Speed in m/s 4.5 5 5 5.5 6	Annual Yield kWh 13,761 17,065 20,188 23,000
GSM CONTROL Annual Average Wind Speed in m/s 4.5 5 5.5 5.5 6 6 6.5	Annual Yield kWh 13,761 17,065 20,188 23,000 25,400
GSM CONTROL Annual Average Wind Speed in m/s 4.5 5 5.5 5.5 6 6 6 6.5 7	Annual Yield kWh 13,761 17,065 20,188 23,000 25,400 27,356



Power Curve: CF6e



SPECIFICATION	SHEET
Rotor Diameter	9 m
Tower	15 m Monopole
Max. Power	11 kW
An. Yield @ 5 m/s av.	24,000 kWh
Rated Wind Speed	9 m/s
Min active wind speed	1.2 m/s
Cut out wind speed	NONE
Annual Carbon Savings	14 - 19 Tonnes
Noise @ 5 m/s at 60m	42 dBA
Rated RPM	220 rpm
Method of Installation	Hydraulic Tilt Installation
Method of Installation GSM CONTROLI	Hydraulic Tilt Installation LED AS STANDARD
Method of Installation GSM CONTROLI	Hydraulic Tilt Installation ED AS STANDARD Annual
Method of Installation GSM CONTROLI Annual Average Wind Speed in m/s	Hydraulic Tilt Installation LED AS STANDARD Annual Yield kWh
Method of Installation GSM CONTROLI Annual Average Wind Speed in m/s 4.5	Hydraulic Tilt Installation LED AS STANDARD Annual Yield kWh 18,880
Method of Installation GSM CONTROLI Annual Average Wind Speed in m/s 4.5 5	Hydraulic Tilt Installation LED AS STANDARD Annual Yield kWh 18,880 24,170
Method of Installation GSM CONTROLI Annual Average Wind Speed in m/s 4.5 5 5.5	Hydraulic Tilt Installation LED AS STANDARD Annual Yield kWh 18,880 24,170 29,450
Method of Installation GSM CONTROLI Annual Average Wind Speed in m/s 4.5 5 5.5 6 6	Hydraulic Tilt Installation LED AS STANDARD Annual Yield kWh 18,880 24,170 29,450 34,400
Method of Installation GSM CONTROLI Annual Average Wind Speed in m/s 4.5 5.5 5.5 6 6 6.5	Hydraulic Tilt Installation LED AS STANDARD Annual Yield kWh 18,880 24,170 29,450 34,400 38,820
Method of Installation GSM CONTROLI Annual Average Wind Speed in m/s 4.5 5.5 6.5 6 6.5 7 7	Hydraulic Tilt Installation LED AS STANDARD Annual Yield kWh 18,880 24,170 29,450 34,400 38,820 42,550
Method of Installation GSM CONTROLI Annual Average Wind Speed in m/s 4.5 5.5 5.5 6 6 6.5 7 7.5	Hydraulic Tilt Installation LED AS STANDARD Annual Yield kWh 18,880 24,170 29,450 34,400 38,820 42,550 45,530

Single or Three Phase **CF11/ CF11i**

Power Curve: CF11



SPECIFICATION	SHEET	
Rotor Diameter	10.8 m	
Tower	15 m Monopole	1
Max. Power	15 kW	1
An. Yield @ 5 m/s av.	34,400 kWh	1
Rated Wind Speed	9 m/s	1
Min active wind speed	2.2 m/s	1
Cut out wind speed	NONE	1
Annual Carbon Savings	19 - 23 Tonnes	1
Noise @ 5 m/s at 60m	40 dBA	1
Max RPM	110 rpm	1
Method of Installation	Hydraulic Tilt Installation	1
GSM CONTROL	LED AS STANDARD	Ŵ
Annual Average	Annual	er (
Wind Speed in m/s	Yield kWh	N N
4.5	26,980	1 *
5	34,400	
5.5	41,730	1
6	48,570	
6.5	54,630	
7	59,700	
7.5	63,750	
8	66.750	

SPECIFICATION SHEET

Single or Three Phase CF15/ CF15i Power: CF15 16.0 14.0 12.0 10.0 8.0 6.0 4.0 2.0 0.0 0 2 4 8 10 12 14 16 6 Wind Velocity (m/s)

Rotor Diameter 12.8 m Tower 20 m Monopole Max. Power 20 kW An. Yield @ 5 m/s av. 47,750 kWh Rated Wind Speed 9 m/s 22.0 Min active wind speed 2.2 m/s Cut out wind speed NONE 20.0 Annual Carbon Savings 26 - 30 Tonnes 18.0 Noise @ 5 m/s at 60m 40 dBA 16.0 Rated RPM 110 rpm Method of Installation Hydraulic Tilt Installation 14.0 ₹ 12.0 **GSM CONTROLLED AS STANDARD** 0.01 Bower 8.0 **Annual Average** Annual Yield kWh Wind Speed in m/s 4.5 37,600 6.0 47,750 57,700 5 4.0 5.5 66,930 2.0 6 6.5 75,050 0.0 7 81,820 0 7.5 87,160 91,100 8

CF 20 Power: CF20

Wind Velocity (m/s)

16

Single or Three Phase

SPECIFICATION SHEET Rotor Diameter 20 m 29 m Monopole Tower Max. Power 50 kW 117,250 kWh An. Yield @ 5 m/s av. Rated Wind Speed 9 m/s Min active wind speed 2.2 m/s Cut out wind speed NONE Annual Carbon Savings 70 - 80 Tonnes Noise @ 5 m/s at 60m TBA Rated RPM 50 rpm Method of Installation Crane **GSM CONTROLLED AS STANDARD** Annual Average Wind Speed in m/s Annual Yield kWh 4.5 92,150 117,250 5

5.5

7

7.5

141,940

6 164,900

202,100

215,500

8 225,400

6.5 185,160

Single or Three Phase CF 50 Power: CF50





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C&F Green Energy is part of the globally renowned Irish owned C&F Group. C&F was first established in 1989 in Galway, Ireland and now employs over one thousand people in over six sites worldwide. With manufacturing locations in Ireland, Germany, the UK, The Czech Republic, the Philippines and China. C&F is a global company with a local face.

The proof of our engineering capabilities can be seen from our customer list which includes IBM, EMC, BMW, Mercedes, Ford, VW, Thermo King to name but a few, all of which have awarded us multiple global contracts.

C&F Green Energy was officially established by the C&F Group in 2006. The group recognized the need to provide a more powerful and safer wind energy solution for the home, farm and business owner. With its experience in the manufacturing area, C&F set about designing an innovative wind turbine that would combine unrivalled performance and power with clean aesthetics and reliability.

With this in mind the company has assembled a world class team of industrial design experts in this field to deliver solutions based on innovation and engineering excellence. The group's success is attributed to its unrivalled levels of workmanship quality, streamlined manufacturing processes and un-surpassed levels of customer care and retention. This team has developed an innovative range of medium-sized turbines that incorporate the same advanced technologies that are used in Mega-Watt sized machines. Leveraging off the company's expertise in manufacturing and design and its global reach, has enabled C&F Green Energy to offer this advanced technology at very competitive prices.

Our commitment to customer service and our confidence in our products are evident in the fact that all customer contracts will be directly with C&F Green Energy and all warranties will be carried by C&F Green Energy. This includes the full parts, labour and service warranty that is available for 10 years. As founder and CEO of the C&F Group I am determined to make C&F Green Energy the world leader in small and medium sized generation. We build the best turbines in the world.

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John Flaherty CEO C&F Group



Tooling Ltd., Ireland Green Energy, Ireland <u>Automotive T</u>rading <u>as</u> Iralco, Ireland

- Manufacturing (UK) Ltd.
- F Automotive Germany GmbH

Manufacturing CR. S.R.O., Czech Republic

Manufacturing Philippines
Corporation, Philippines
Manufacturing China

IT Industry Automotive In

Automotive Industry Refrigeration Industry Air Conditioning Industry Wind Energy Industry Delivering world class manufacturing processes all over the world ESTABLISHED IN 1989. IRISH OWNED.







