



Windfall of Energy



CONSOLIDATED ENERGY CONSULTANTS LIMITED

Demand for Energy – more particularly in the form of electricity – is proportionately increasing with growth in GDP.

Depletion of fossil fuel stock and increase in cost thereof at an alarming rate besides environmental issues are matters of serious concern for all Developing Nations.

Perpetual availability of non-polluting electricity produced through conversion of wind flow as an alternative is therefore a matter of keen interest for planners.

With greater policy support and given the global potential for growth, at least in the long term, a brighter future for wind clearly emerges. If we believe that 'nothing will stop the strength of an idea of which the time has arrived' – we believe that nothing can stop the wind.



Core Competence

Conversion of Kinetic energy in wind for production of electricity calls for multidisciplinary engineering and scientific input, and that is what we offer.

Understanding the need of the sector in totality and continuous upgradation of knowledge base and skill strengthens our competence.

CECL today not only offers services on all related technical aspects of Wind Power projects but also beyond Concept-to-Commissioning, based on acquisition of the most recent data bases and computer software for knowledge enhancement.

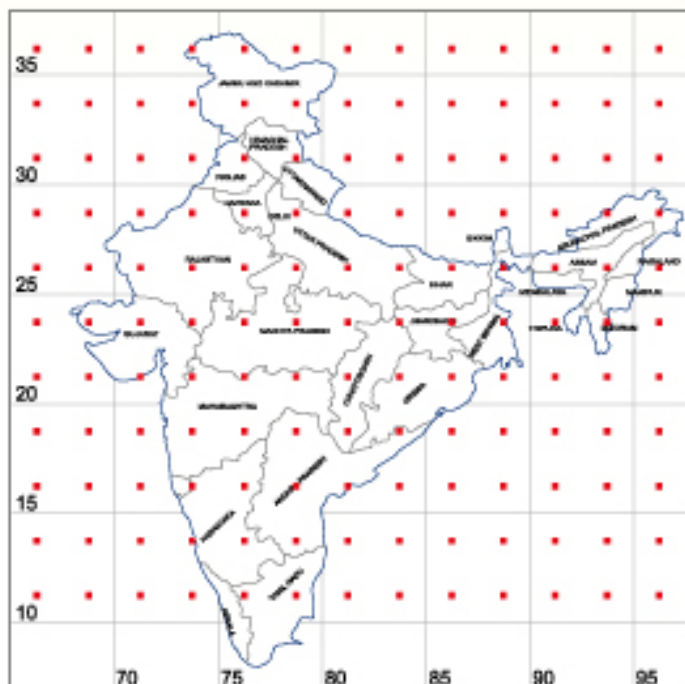
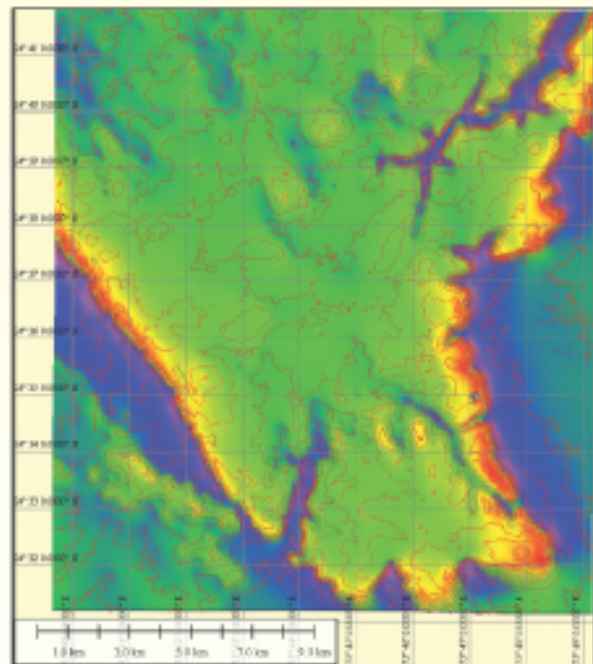


The Spectrum of CECL Services



Anemometry & Wind Resource Assessment

- Long term surface wind data accessed from international sources for Grid Points nearest to the site.
- Meso-and-Micro Scale wind power density / wind speed mapping for site locations with accurate contour/terrain data.
- Spot-selection for installation of Anemometry systems including cup-counter anemometer, wind vane, temperature sensor and mini-computers for data recording - all mounted on 50 meters or more tall towers.
- Critical analysis of recorded wind data formatted to represent wind characteristics and validated with reference to nearby Anemometry masts.

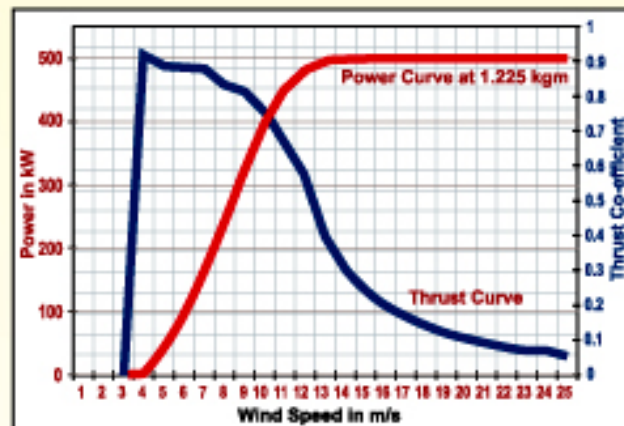


CECL has identified on their own 3 locations in virgin unexplored regions for 300 MW wind projects.

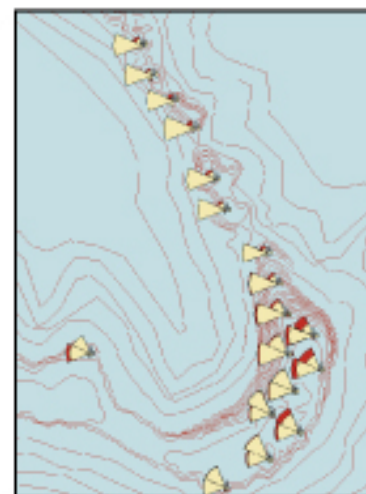
Layout Design, Energy Estimation & Micro-siting

- ❑ Wind Resource data formatted for speed and direction.
- ❑ Formatting of characteristic power curve of selected Wind Electric Generator (WEG).
- ❑ Correction factors for site-specific Air density applied.
- ❑ Detailed contour data prepared at short intervals to indicate roughness and terrain features including obstacles & exclusions.
- ❑ Advanced computer software utilized to optimize WEG layout, creating Micrositing map and estimating energy generation.
- ❑ Accuracy regarding grid & machine availability is ensured.

At CECL desk top study is never enough, two decades of field experience and at-site observations are used to ensure reliability, and optimization is achieved through advanced software.



Wind Speed Range in mph	Directional Frequency Distribution in Hours								Total	
	N	NE	E	SE	S	SW	W	NW	Hrs.	%
0 - 6	60	82	135	80	31	45	312	222	966	11.03
6 - 8	104	116	107	55	36	38	130	170	756	8.63
8 - 10	130	145	134	68	45	47	162	213	943	10.76
10 - 12	145	163	150	78	50	53	182	239	1058	12.08
12 - 14	35	75	185	100	31	41	346	275	1089	12.43
14 - 16	34	72	180	97	30	40	336	267	1057	12.07
16 - 18	30	62	154	83	26	35	289	230	809	10.38
18 - 20	2	12	77	69	13	36	331	142	682	7.79
20 - 22	2	8	54	48	9	25	230	99	475	5.42
22 - 24	1	6	37	33	6	17	159	68	328	3.74
24 - 28	0	0	4	5	3	14	150	37	213	2.43
26 - 28	0	0	3	3	2	8	90	22	126	1.46
28 - 30	0	0	1	2	1	5	52	13	74	0.84
30 - 32	0	0	1	1	0	3	28	7	41	0.47
32 - 34	0	0	0	1	0	2	16	4	23	0.26
34 - 36	0	0	0	0	0	1	7	2	10	0.11
36 - 38	0	0	0	0	0	0	3	1	4	0.05
>> 38	0	0	0	0	0	0	3	1	4	0.05

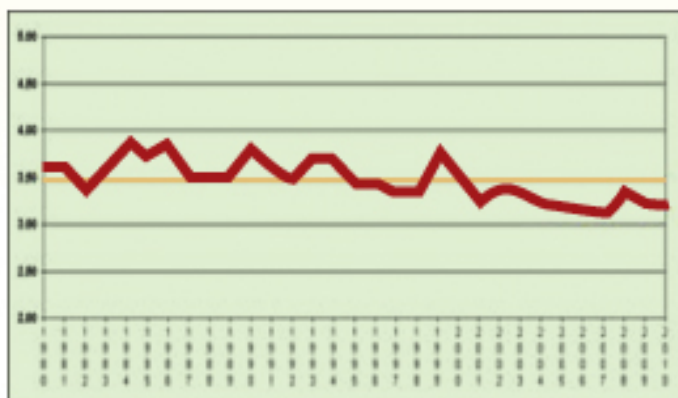


Validation of Energy Estimation

- One-year wind data from Anemometry Mast is verified with other data drawn from nearby locations and used for energy estimation.
- High altitude wind data collected through Satellite is also used to predict long-term validation of one year wind data.
- Probability analysis is carried out at P-50, P-75 and P-90 level.

CECL has access to a large data base of national & international sources for validation for the long-and-short term. Operational data from other projects are used for reconfirmation.

Class Interval MPH	Average Wind Speed in MPH	Wind Speed (M/S)		Frequency (%)	Freq. Dis. in Hrs.	Wind Speed	Power Curve	Actual Curve	Generation in kWh
		A125 m	A180 m						
(1)	(2)	(3)	(4) (CoPLI)	(5)	(6)	(7)	(8)	(9)	(10) (Pmax)
0 - 5	3	1.34	1.51	11.80	865	1	0.09	0.00	0
5 - 8	7	3.12	3.63	8.83	768	3	0.09	0.00	0
8 - 10	9	4.32	4.84	10.76	843	4	3.19	28.08	2360
10 - 12	11	4.92	5.58	12.80	1068	5	43.80	72.08	76768
12 - 14	13	6.01	6.86	12.43	1068	5	86.50	132.38	140728
14 - 16	15	6.71	7.63	12.87	1057	7	163.90	258.03	218688
16 - 18	17	7.60	8.63	10.38	828	8	282.90	388.31	282883
18 - 20	19	8.49	9.68	7.78	692	9	326.90	368.08	293317
20 - 22	21	9.39	10.69	5.42	475	10	400.90	428.68	204873
22 - 24	23	10.28	11.80	3.74	328	11	482.90	468.48	152893
24 - 26	25	11.18	12.81	2.63	213	12	481.90	468.33	106142
26 - 28	27	12.07	13.82	1.86	138	13	484.90	486.48	63641
28 - 30	29	12.96	14.82	0.94	74	14	486.90	498.24	30344
30 - 32	31	13.86	15.84	0.47	41	15	600.90	608.08	20580
32 - 34	33	14.75	16.84	0.26	23	16	600.90	608.08	11980
34 - 36	35	15.65	17.86	0.11	10	17	600.90	608.08	6080
36 - 38	37	16.54	18.86	0.06	4	18	600.90	608.08	2080
38 - 40	39	17.43	19.86	0.05	4	19	600.90	608.08	2080
40 - 42	41	18.33	20.88	0	0	20	600.90	608.08	0
42 - 44	43	19.23	21.88	0	0	21	600.90	608.08	0
44 - 48	45	20.12	22.70	0	0	22	600.90	608.08	0
				100	1070				1803388



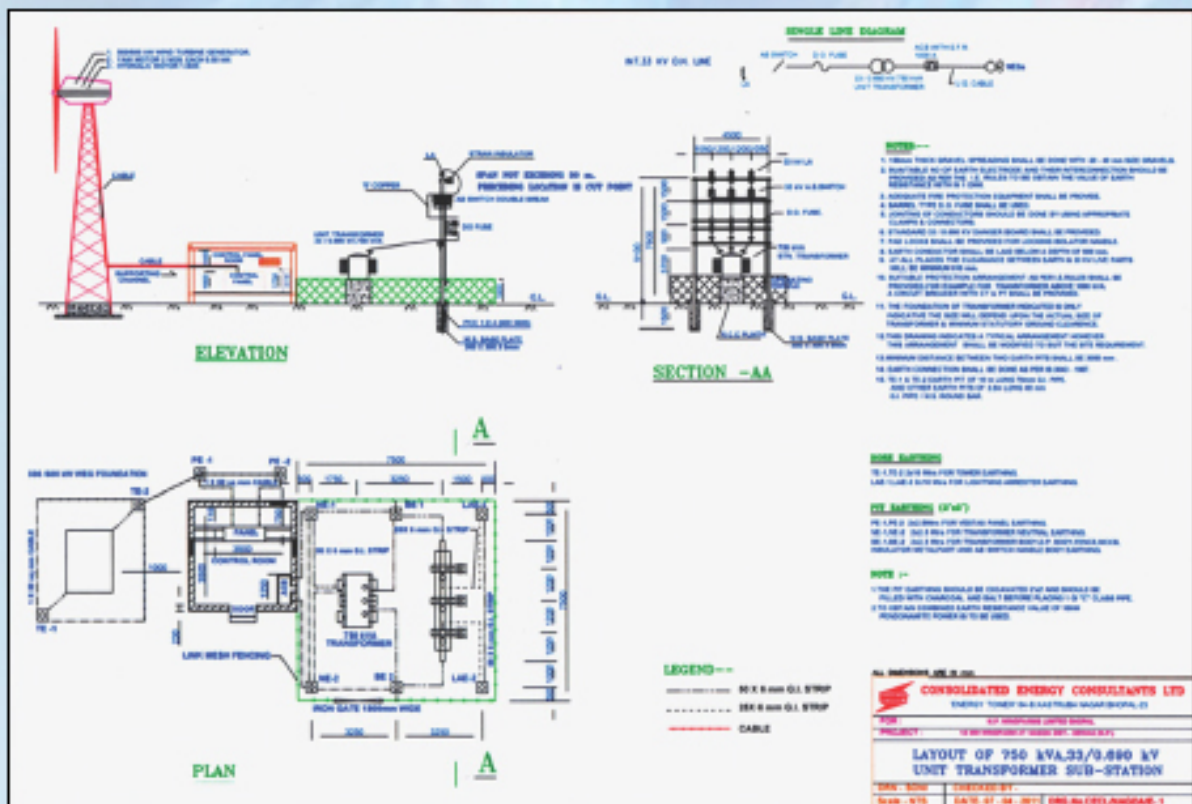
- All energy estimation figures are rigorously analyzed by way of accuracy, correction factors, and year-to-year variation.
- Contract documents are studied in detail to ensure compliance of statutory rules, permissions, clearances and on-time commissioning.
- Success of a wind farm project is ensured by validation of technical parameters and commercial aspects like options for generation utilization (captive, third-party sale or sale to utility) and detailed Cash Flow Analysis and other variables.
- CECL carries out 'due diligence' for long-term viability of the project based on risk mitigation measures.

CECL's knowledge and experience give it a clear understanding of regulatory and commercial issues, selection of optimum parameters etc.

Design Engineering & Project Report

- Detailed survey and field study are conducted post finalization of site, make & rating of WEG and energy selling options.
- Comprehensive layout design is prepared keeping in mind optimum generation as also requirement for approach road and grid evacuation.

CECL's long experience in project implementation and operation of wind farms helps the company prepare realistic design solutions for safe transportation (especially in hill areas), grid reliability, high machine availability and capital cost reduction.





Feasibility Study

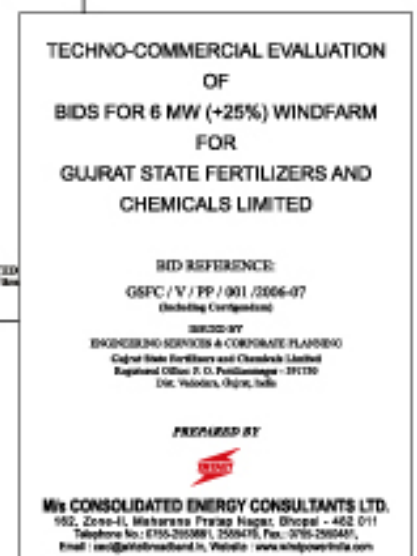
- Evaluates options for installations in different states and use of different types of WEGs.
- Evaluates ROI (Return on Investment) under various options of sale / utilization of energy based on comparative merits.
- Ensuring project profitability & viability and building up confidence (in the light of still emerging technology and limited experience).

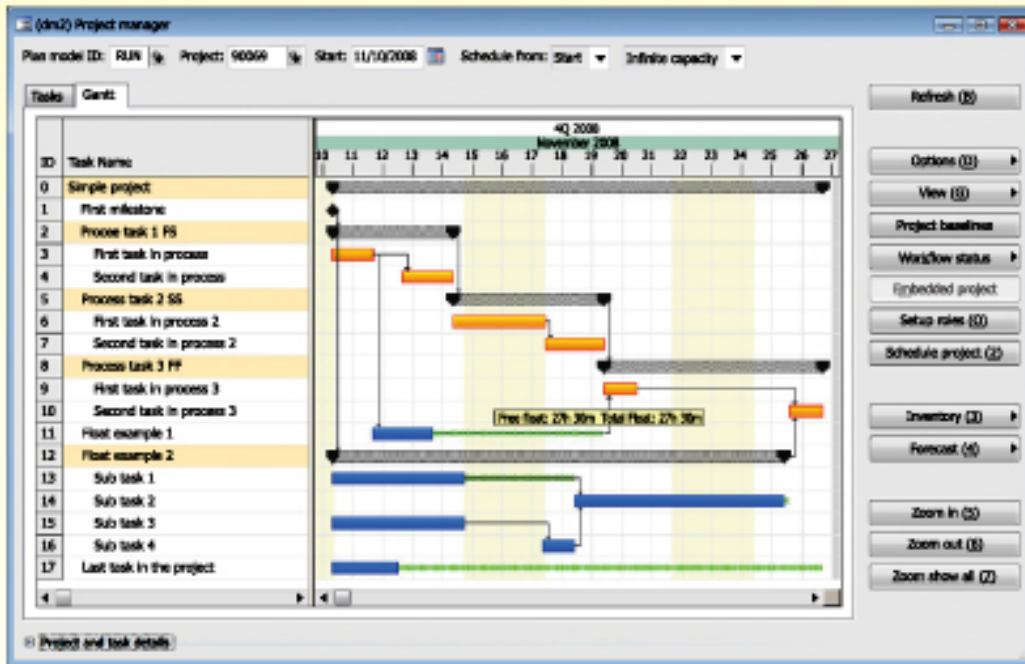
CECL is fully capable of projecting correct merits / demerits and indicates profitability with reasonable accuracy – to facilitate investment decisions.

Procurement & Contracting

- WPP offers attractive financial return in the long term – procurement of WEGs and creation of Infrastructure with related Civil & Electrical works are crucial in the long-term perspective.
- CECL ascertains WEG technologies, suppliers credibility, efficiency of O&M arrangements – for long term trouble-free operation of projects.

CECL is credited with preparing numerous high-accuracy bidding documents for PSUs and Private Sector Corporate bodies. Techno-commercial evaluation and drafting of Contract Agreement is done based on vast experience.





Project Management

CECL undertakes multi-disciplinary activities related to technical, financial and commercial aspects of implementation & management of WPPs.

CECL's pool of highly experienced, professionally trained engineers from civil, electrical, mechanical and electronics disciplines supervise the construction, conduct quality checks at site and monitor on-time commissioning to ensure early generation & revenue earning.





Monitoring

- CECL critically monitors and analyses wind resources, frequency of breakdown of machines and systems.
- This ensures avoidance of breakdown or failure of WEG and evacuation systems especially during limited high-wind months.

CECL with its associate company M.P. Wind Farms carries out continuous on-line monitoring, development of maintenance protocol and site visits – which in turn ensure trouble-free operation and loss reduction.

Performance Improvement

- Regular analysis of monitoring reports and on-site observations coupled with in-depth study help improve performance – by reducing breakdown time and internal losses.
- CECL can provide site-specific reports on increasing generation, overall low PLF, parameter setting and operational / control logic.

CECL can also conduct study & analysis to ensure high machine availability, reduction in internal consumption / loss and maximizing earnings.



Repowering

In the early 90s, for all the demonstration and initial private sector projects, the rating of individual turbines varied between 225 and 250 kW with hub-height of 30 meters.

Today with technology advancements, ratings are available at 1500 kW and hub-heights of 80 meters and above.

Windy locations are limited and in national interest 20-yr old small turbines need to be replaced by higher-rated more efficient WEGs to substantially increase energy generation per hectare of land used.

CECL has carried out 3 such studies including the 1st private sector Wind Farm of Dalmia Cement Bharat Ltd. – which translates into service provided to two generations of turbines at the same site.

Techno-Commercial

CECL's core expertise is technology, but it has never remained indifferent to financial / commercial aspects.

Variability factors in WPPs are constraints for purely financial consultants to predict accurate results.

CECL is a solution-provider in this vital area to:

World Bank: For assessment of Investment Potential.

ADB: for Preparation of Business Plan.

IREDA: Investment Climate for IPPs.

CECL knows that Commercial Wind Power projects are still at nascent stage, needs *stakeholder orientation* – and the company organizes motivational business meets, investor meets, interactive sessions for different stakeholders on a regular basis.

Orientation Programs for Engineering Students are also taken up – because of absence of academic curricula in the field.

The objective is not just upgradation of knowledge and skills within the organization only but also to share the acquired knowledge.

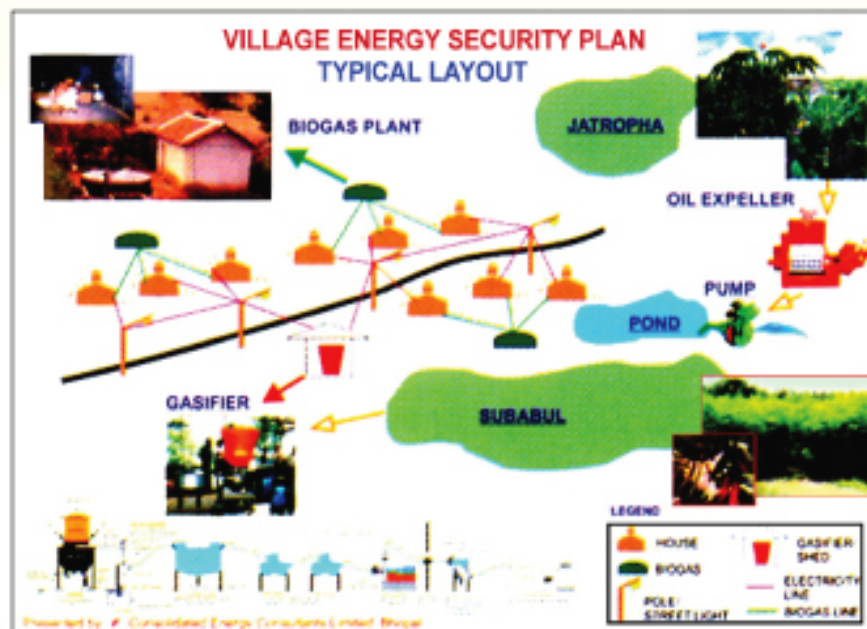


Energy Security

- CECL believes that Wind and other Renewable Energy sources are needed to benefit agriculture and vast rural communities living in remote locations. Decentralized power generation through locally available resources is a priority area.
- CECL surveyed, designed and executed the 1st Project under *Village Energy Security Program* (VESP) launched by the Ministry of New & Renewable Energy (MNRE), Govt. of India at Village Kasai, Betul District, Madhya Pradesh.
- CECL's latest challenge is to scientifically assess wind resources and development of several projects in the North-Eastern States, Sikkim, and Leh & Kargil. These will be Wind-Solar Hybrid projects and

will be designed to meet the mounting needs of people in areas where grid-supply cannot be ensured.

- This commitment has led CECL to experiment continuously with Stand-alone Battery Charging, Biomass gasification and Wind-Diesel Hybrid systems and other innovative concepts to ensure total Energy Security in terms of availability and affordability.



Future Outlook

India has made a firm commitment on environment protection and increased usage of pollution-free Renewable Energy. This is integral to the *National Action Plan on Climate Change (NAPCC)*.

For Conventional Power Generating utilities it is now mandatory to produce *clean energy*. And this has created enormous demand for Wind Power Projects.

The unique and innovative tool of *Renewable Energy Certificate (REC)* has been introduced to allow *trading of wind power* at a remunerative rate, which makes WPPs commercially viable. The resulting market boom foretells busy years ahead for the wind power sector.

CECL, always quick to respond to situations, has already ventured into identification and development of sites for large projects. Disposal of such sites will finance Wind Turbine ownership and create a separate stream of steady revenue earning.

For CECL **repowering** of old wind farms will be a new facet with high potential.

Development of several projects in the North-Eastern States, Sikkim, and Leh & Kargil has already begun and national budgetary allocations are already pointing to a *bright energy-secure future*.



CUSTOMER SATISFACTION

Customer's satisfaction gets well established through repeat orders.

LIST OF CLIENTS WHO OFFERED THREE AND MORE ASSIGNMENTS

S. No.	Client	No. of Assignments	S. No.	Client	No. of Assignments
1	Ministry of New & Renewable Energy, New Delhi	20	14	Gujarat Heavy Chemical Industries Ltd., Noida & Madurai	5
2	DLF Limited, New Delhi	16	15	Non-Conv. Energy Dev. Corpn. of A.P., Hyderabad	5
3	MSPL Limited, Karnataka	14	16	Gujarat State Petroleum Corporation Ltd, Gandhinagar	4
4	Dalmia Cement (Bharat) Ltd. Dalmiapuram	12	17	Indian Renewable Energy Development Agency Ltd.	4
5	KSK Energy Ventures Limited, Hyderabad	11	18	Jagdamba Power and Alloys Ltd., Raipur	4
6	Maharashtra Energy Development Agency, Pune	10	19	NEPC-India Ltd, Chennai	4
7	Karnataka Renewable Energy Deve. Ltd, Bangalore	9	20	SBI Capital Markets Limited, Mumbai.	4
8	M.P. Urja Vikas Nigam, Bhopal	7	21	SkyZen Infrabuild Pvt Ltd, Mumbai	4
9	Karnataka Power Corpn.Ltd., Bangalore	6	22	DANIDA, Govt. of Denmark	3
10	NEG Micon (India) Pvt. Ltd. Chennai	6	23	Hindustan Petroleum Corpn. Ltd Mumbai & New Delhi	3
11	Suzlon Energy Ltd Ahmedabad	6	24	Mohan Breweries & Distilleries Ltd., Madras	3
12	Amarjothi Spinning Mills Ltd Nambiyur	5	25	ONGC, Dehradun (Through MPWL)	3
13	Centre for Wind Energy Technology Chennai	5	26	Poorva Powergenco Ltd Bangalore	3

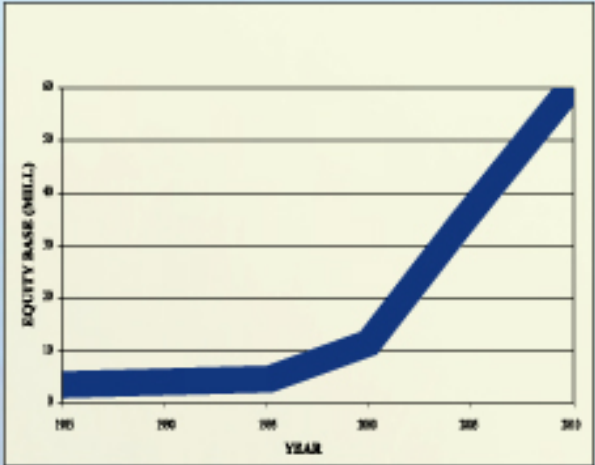
Truly speaking, our long list of satisfied customers constitute our marketing team



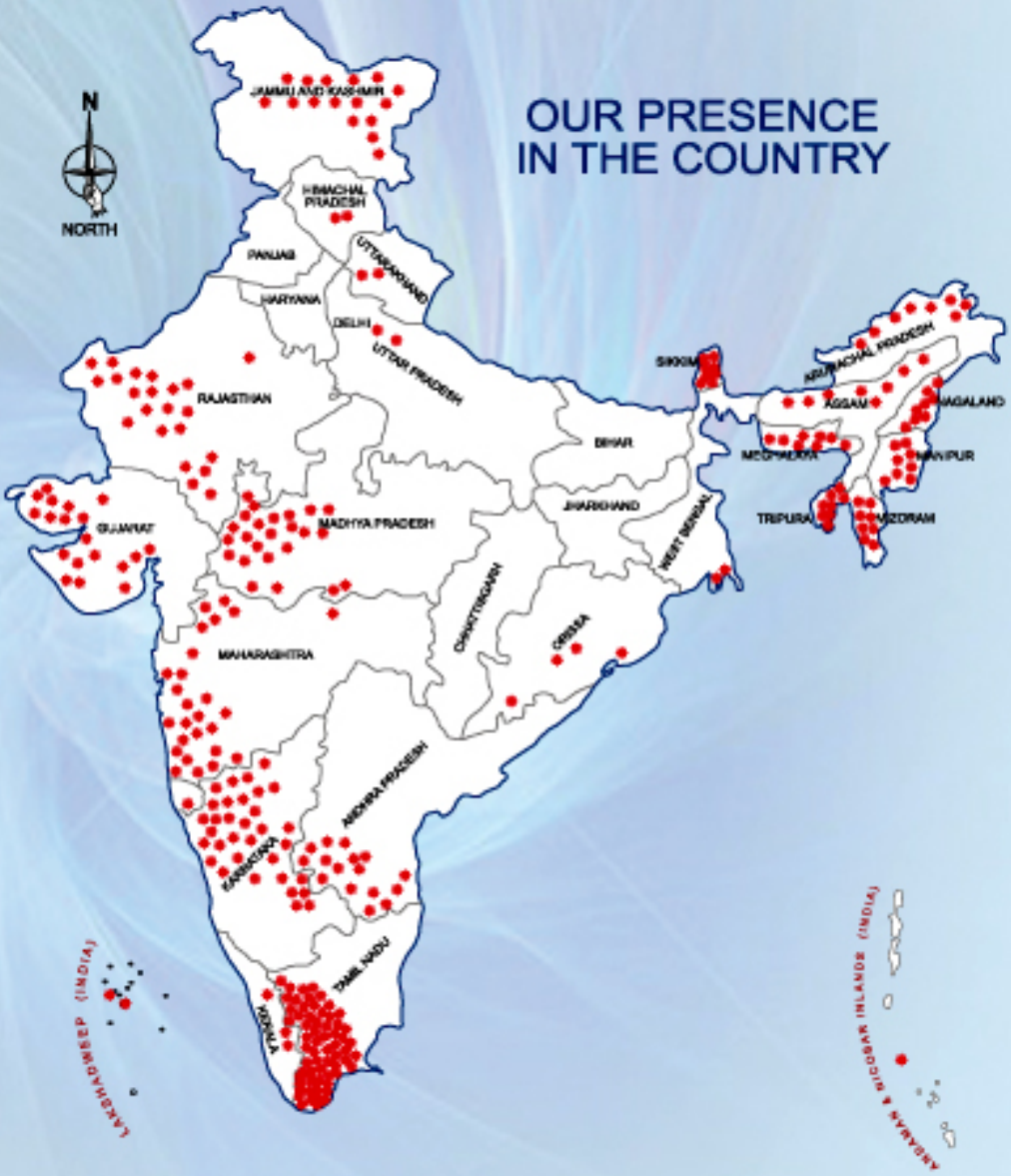


SOME OF OUR VALUED CLIENTS

 WORLD BANK	 ADB	 DANIDA	 ICEF INDO CANADA	 WINROCK	 MNRE
 ONGC	 REGEN	 JSW	 JINDAL	 SUZLON	 ANERT
 RCF	 GMR	 AMAR JYOTHI	 BSES	 GHCL	 KREDL
 GAIL	 POORVA	 C-WET	 MERC	 SKYZEN	 MEDA
 GSFC	 KSK ENERGY	 DLF	 MSPL	 ELECON	 GEDA
 HPCL	 KRIBHCO	 HZL	 DCBL	 GFL	 MPUVN
 GSPN	 GREEN INFRA	 JP ASSOCIATE	 PAHARPUR	 COWI DENMARK	 RREC (REDA)
 GMDC	 VESTAS	 MBDL	 MAGMA	 SRIRAM	 NEDCAP
 PTC	 IREDA	 PFC	 SBI	 CRISIL	 WBREDA



Our human resource base as on 31.03.2011 is 716 Man-years of experience, out of which 294 Man-years is exclusively in the Wind Power Sector.



* WIND ENERGY CONSULTANCY SERVICES PROVIDED BY C.E.C.L. (302 PLACES)

WE ALSO CARRIED OUT WIND RESOURCE ASSESSMENT IN NEPAL & MAURITIUS

CECL Philosophy Statement

The growth story of CECL will continue despite the fact that electricity constitutes a small fraction of the vast energy sector, and renewable energy occupies an even smaller space. CECL has not made waves but it has set out ripples intended to benefit the common man in far-away places. It is in tune with CECL's corporate belief that a technology is relevant only if it contributes to enhancing the quality of life.

CECL's aspirations were clear from the beginning:

Remain a pioneer.

CECL was the first consultant in the Wind Energy sector in India and for 25 years the company has thought ahead, anticipated requirements and enriched itself with advanced knowledge in design, planning and execution and to meet challenges and opportunities.

Stay committed.

CECL's commitment to deliver and complete any assignment in time is only part of its bigger commitment to stay in the clean-energy business and achieve sustainable energy security.

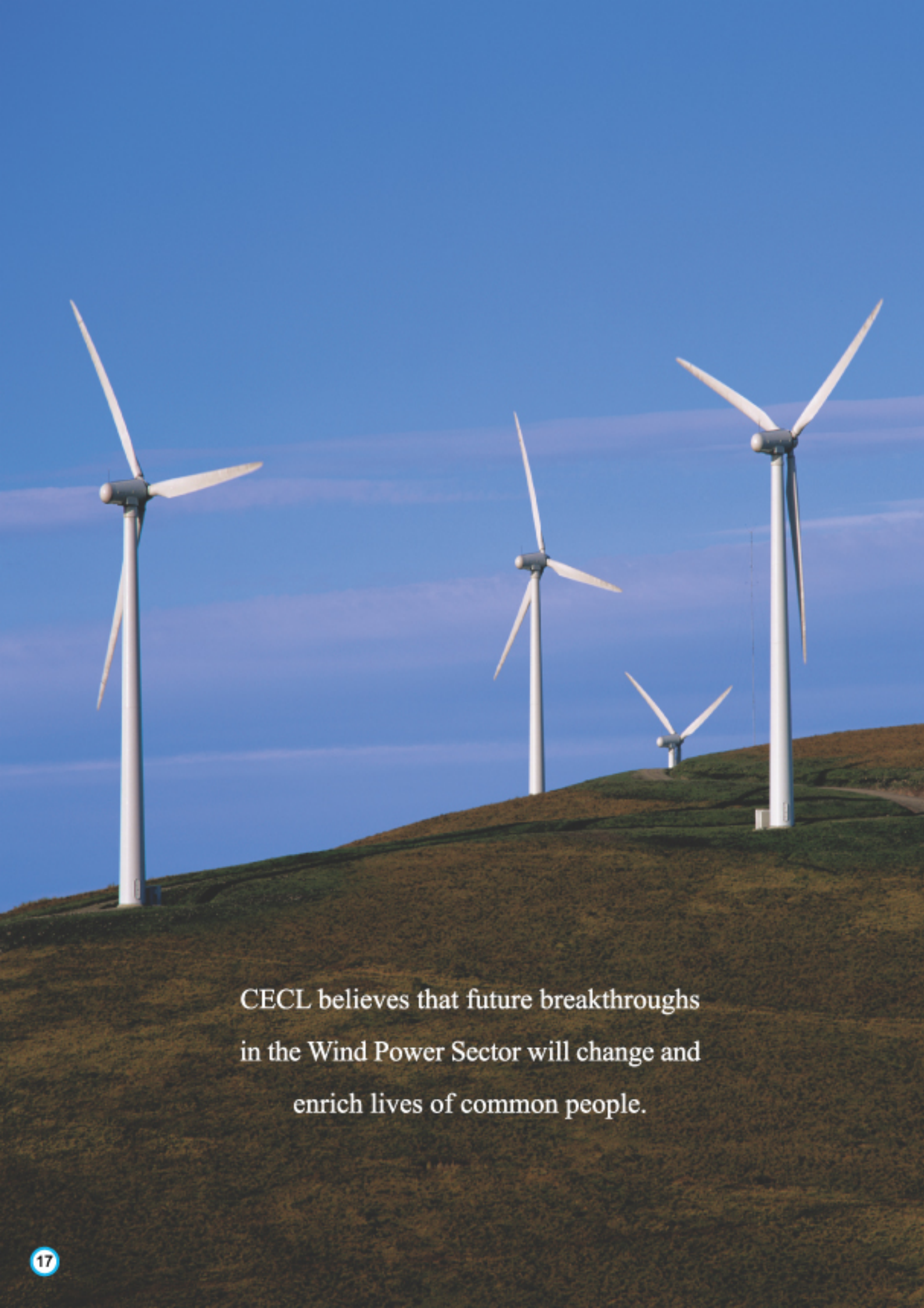
Be ethical.

Ethical practices in business and commercial dealings are integral to CECL's workings. Quality assurance for clients and society is of paramount importance.



"So long as the millions live in hunger and ignorance, I hold every man a traitor, who having been educated at their expense, pays not the least heed to them".

Swami Vivekananda



CECL believes that future breakthroughs
in the Wind Power Sector will change and
enrich lives of common people.



CONSOLIDATED ENERGY CONSULTANTS LIMITED

AN ISO 9001 - 2008 CERTIFIED COMPANY

ENERGY TOWER, 64, B-SECTOR, KASTURBA NAGAR, BHOPAL- 462023

Tel. : 91-755-2600241-43 & 4058931 Fax : 91-755-2600240

E-mail : cecl@airtelmail.in • Website : www.windpowerindia.com