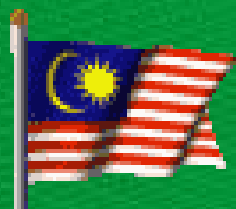


JEMPUTAN SEBAGAI PENCERAMAH BAGI SEMINAR MELAKA MAJU NEGERI BANDAR TEKNOLOGI HIJAU



GREEN TECHNOLOGY MELAKA INNOVATION IN WIND



Speaker Uwe
Ahrens

Prepared by
Tayfun Koksal

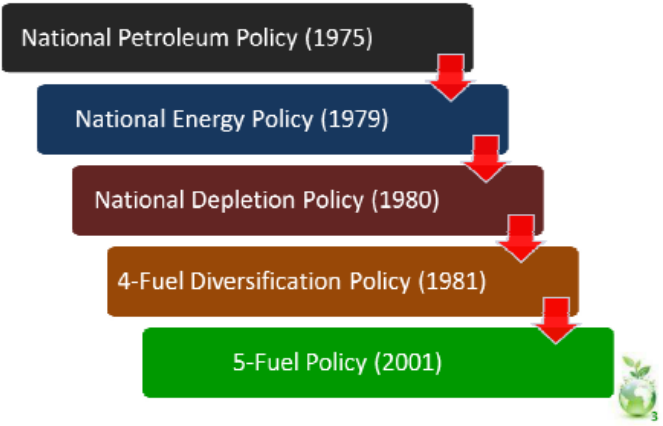
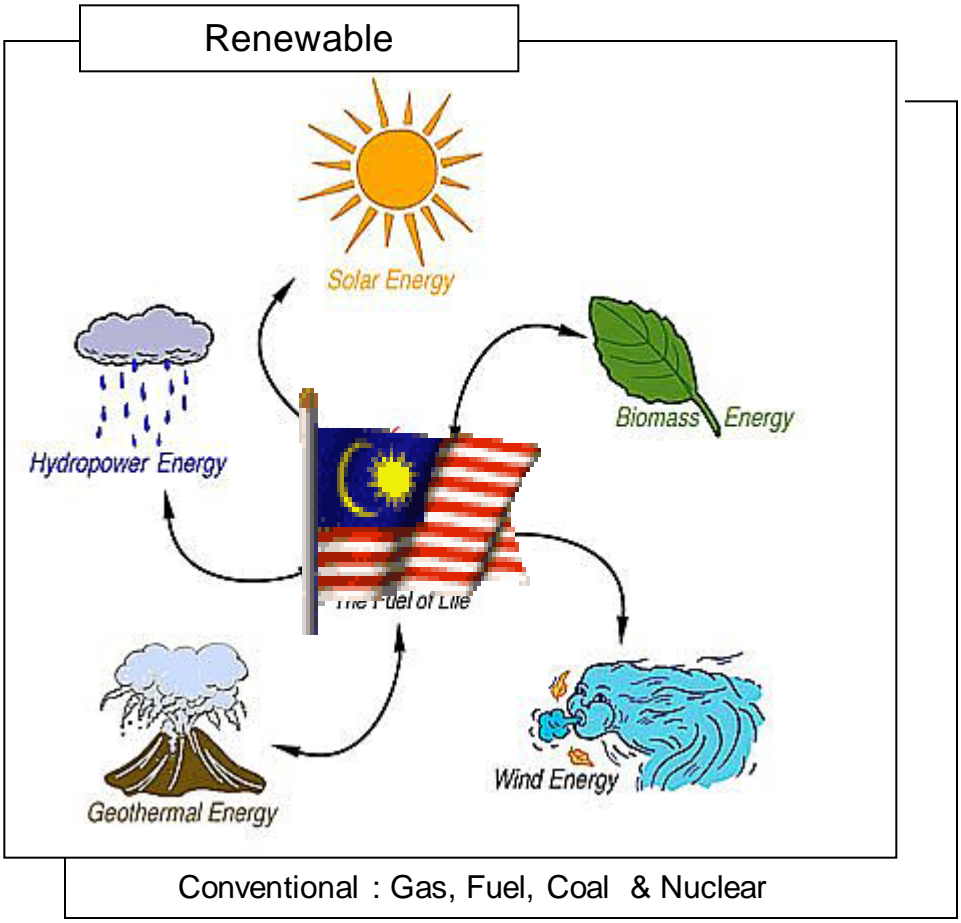


In conjunction with
Ministry of Energy, Green Technology and Water
28th March 2011

Presentation for Wind Park Development by Aquilo

- Wind is viable in Malaysia
- Individual assessment
 - Detail proposal
- Available Now & Fast

Uwe Ahrens, Director



Energy Mix based on Viability



AQUILO WIND ENERGY



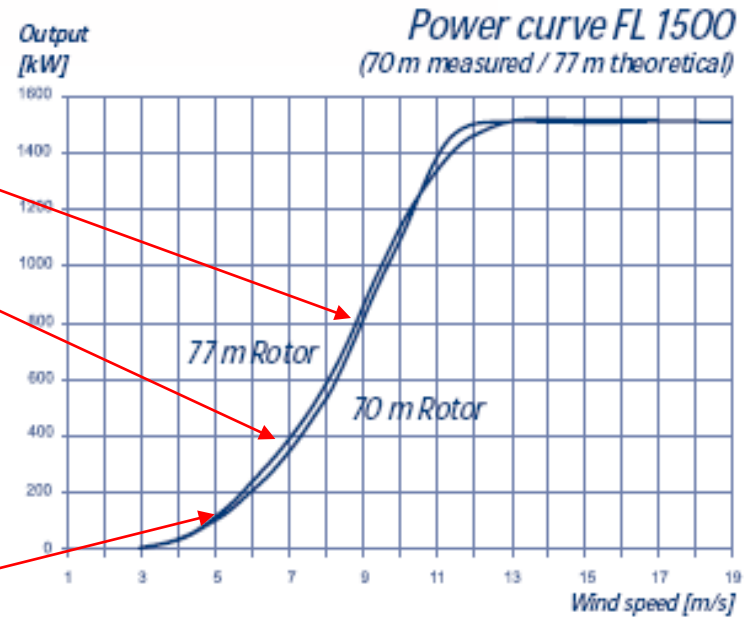
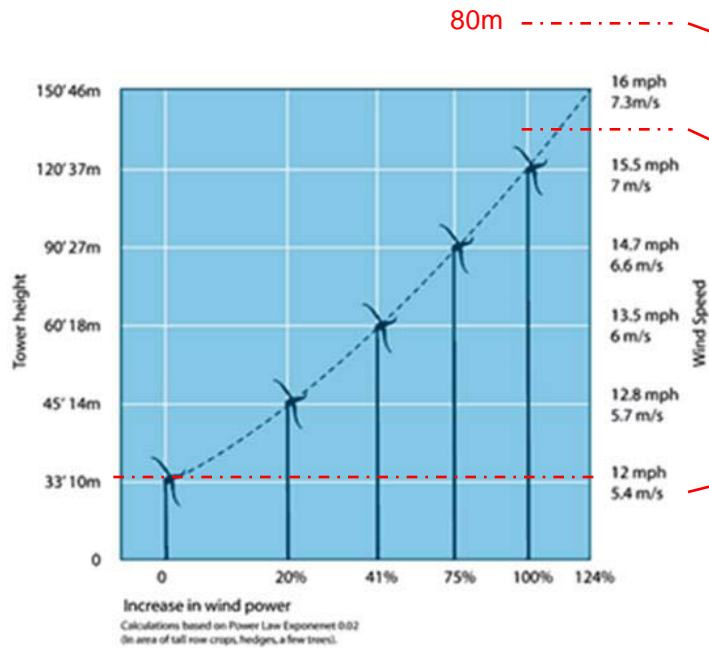
Simple
Durable
Sustainable
Proven
Easy to build, install and maintain

Location independent
Fast to Develop
Operates 24/7
Space Saving

**MALAYSIAN TECHNOLOGY FOR
OUR
ECONOMY AND ENVIRONMENT**

**But, we need wind
>4.0m/sec**

Why Wind is viable



m height	Wind m/s	increase	Power kW	
10	5.3	100%	110	100%
40	7.1	134%	380	345%
80	8.9	168%	800	727%

NO assumptions – Based on facts only
Viable wind parks can be developed in various
places in Malaysia

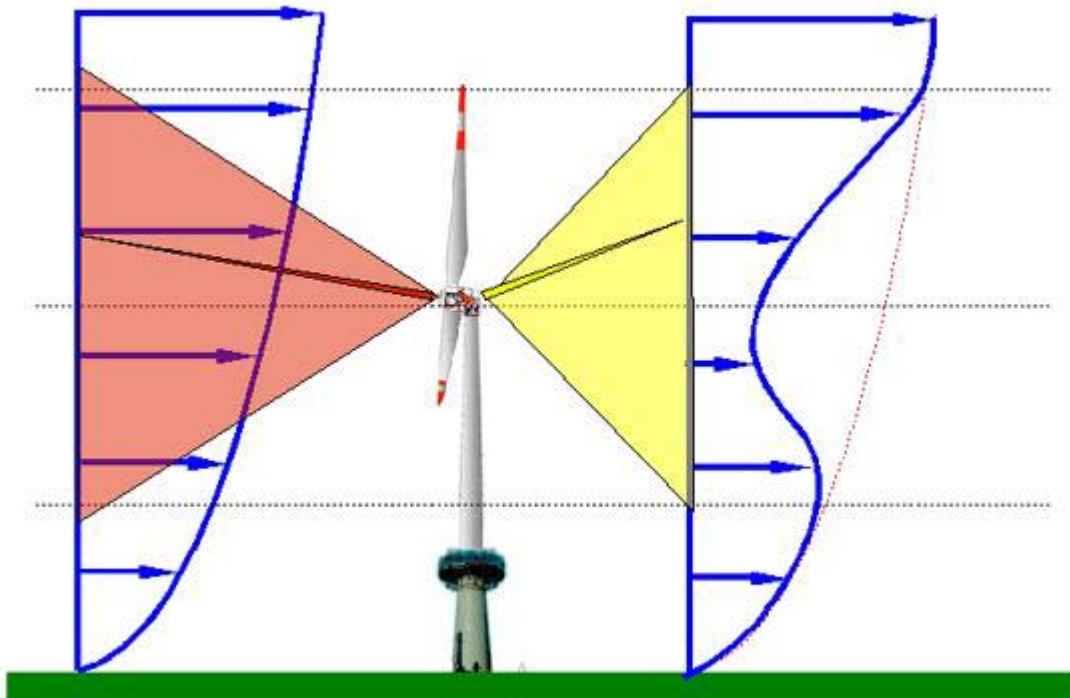


**Aquila has carried out detail
Tests and Assements all over Malaysia
Detail feasibility for Sabah, Mersing & Melaka**



Detail feasibility for location

Investment of over US\$170,000



Test Equipment	US\$ 21,300
Computer Program	US\$ 28,500
Engineer 3pax	US\$ 65,700
Data Acquisition	US\$ 5,060
Travel/Accommodation	US\$ 17,333
Office	US\$ 19,200
Others	US\$ 15,000
	US\$ 172,093

More than 10,000 data sets analysed

Wind Analysis Summary Report

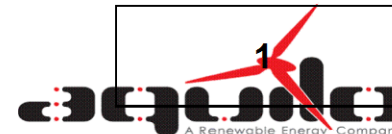
Site Number

Site Information

Project: Meteorological Station
 Location: Kudat Sabah
 Site Elevation: 30 ft
 Averaging Time: 60 min

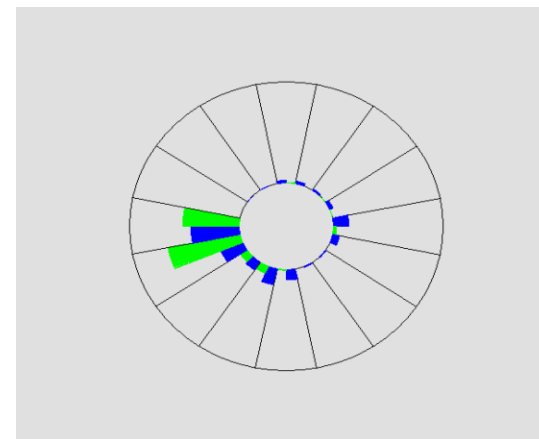
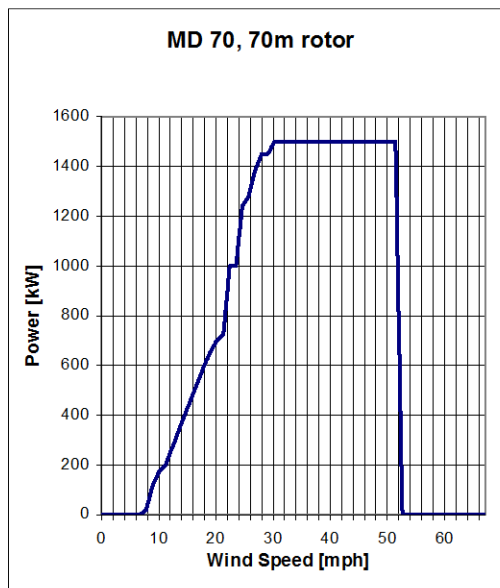
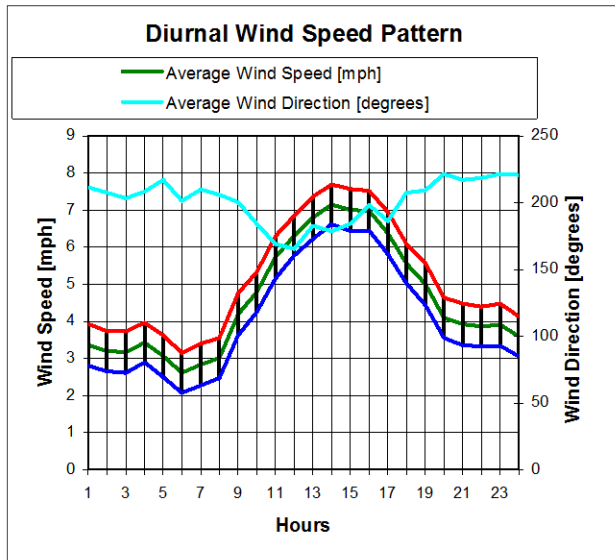
Sensor Information

Sensor/Tower Height: 262 ft
 Scaled Height: 262 ft
 Windvane Offset: 0 degrees

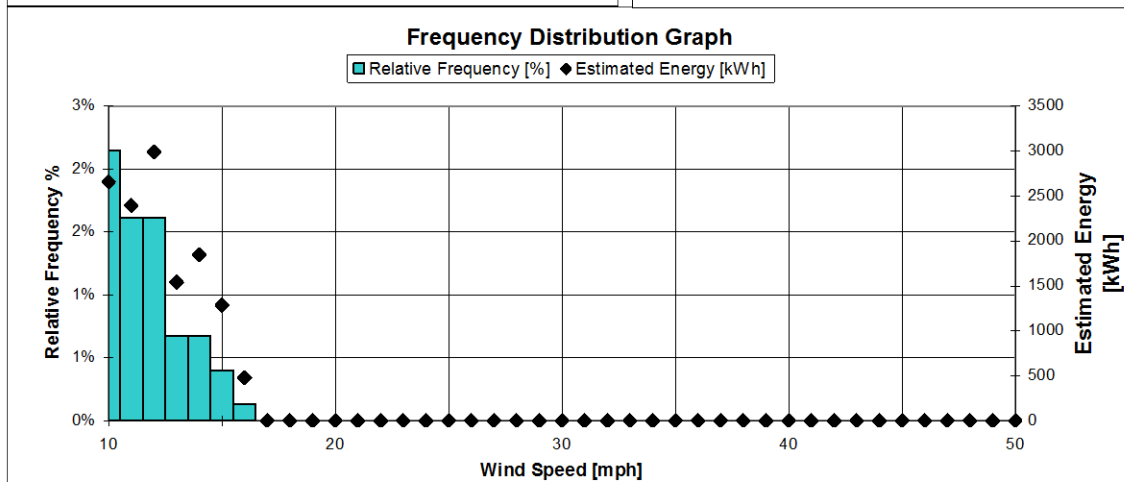


Wind Rose Graph

Date Range: 10/1/10 0:00-10/31/10 23:00



■ Percent of Total Wind Energy Inner Circle = 0%
 ■ Percent of Total Time Outer Circle = 70%



Statistics

Days Used in Calculation: 31.00
 Hours Used in Calculation: 744.00
 Gust Speed: 15.97948022 mph
 Gust Time: 10/20/2010 13:00
 Estimated Energy Output: 176989 kwh
 Calculated Air Density: 1.224 kg/m³
 Average Wind Speed: 4.59 mph
 Average Wind Direction: 203 degrees
 Capacity Factor: 26.88%
 Turbine Manufacturer: Fuhrlaender
 Turbine Model: MD 70, 70m rotor
 Turbine Rating: 1500 kW
 Estimated Annual Production: 2123868 kwh/year
 Scaled Est. Annual Production: 2166345 kwh/year
 Scaled Air Density: 1.214 kg/m³
 Scaled Capacity Factor: 0.01

AQUILO in Melaka



Malaysian Technology Company



Focus on Clean Energy



First implementation phase is wind



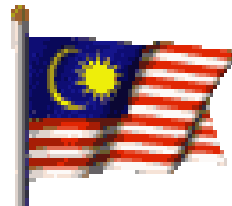
Technology centre



Research and fact base



- Aquilo will create jobs in manufacture, assembly and service for wind energy which are safe for many years to come.
- Long term commitment with training of the staff who will be employed at wind mills with training centers.
- Aquilo has a partnership with Fuhrländer AG Germany and will install “German Made” Technology with high performance turbines
- We are ready

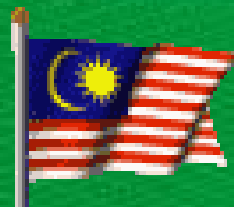


Technology & Path Forward

Aquilo Business

Wind Parks

Business Case



Turbine Technology Constantly Improving

- Larger turbines
- Specialized blade design
- Power electronics
- Computer modeling produces more efficient design
- Manufacturing improvements



Make it viable for Melaka

Benefits of wind power

- No air pollution, inexhaustible supply
- No greenhouse gasses
- Does not pollute water with mercury
- Wind power requires less space than conventional power plants
- Stable cost
- The energy consumption for production, installation, operation and decommission of a wind turbine is usually earned back within 3 months of operation.

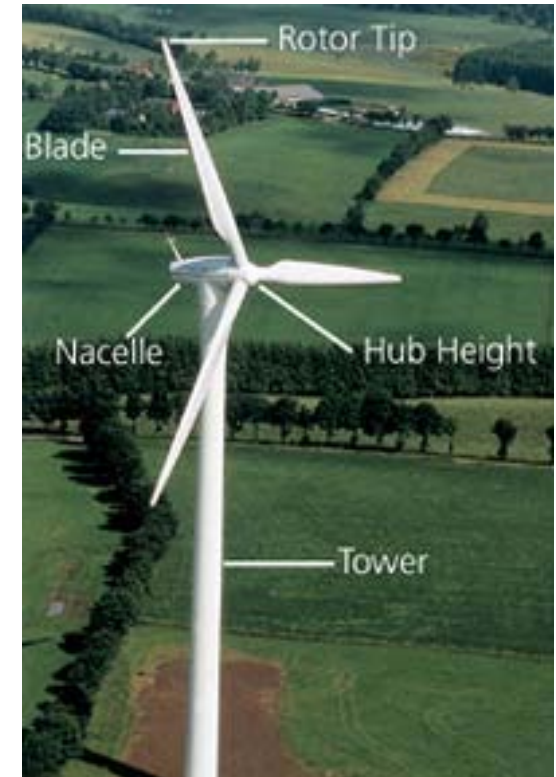
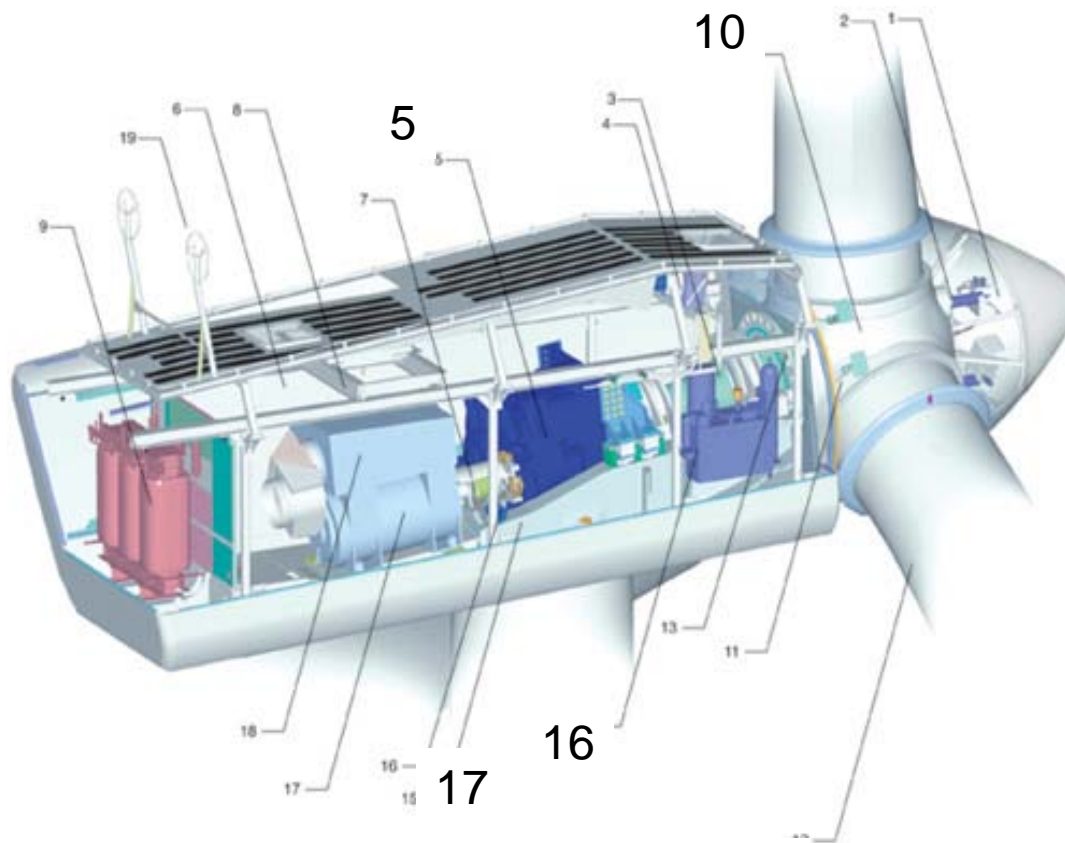


Economics and Determining factors

- **Wind Speed (the better the wind the lower the cost)**
- **Turbine design and construction (at same wind speeds a larger wind mill is more economical)**



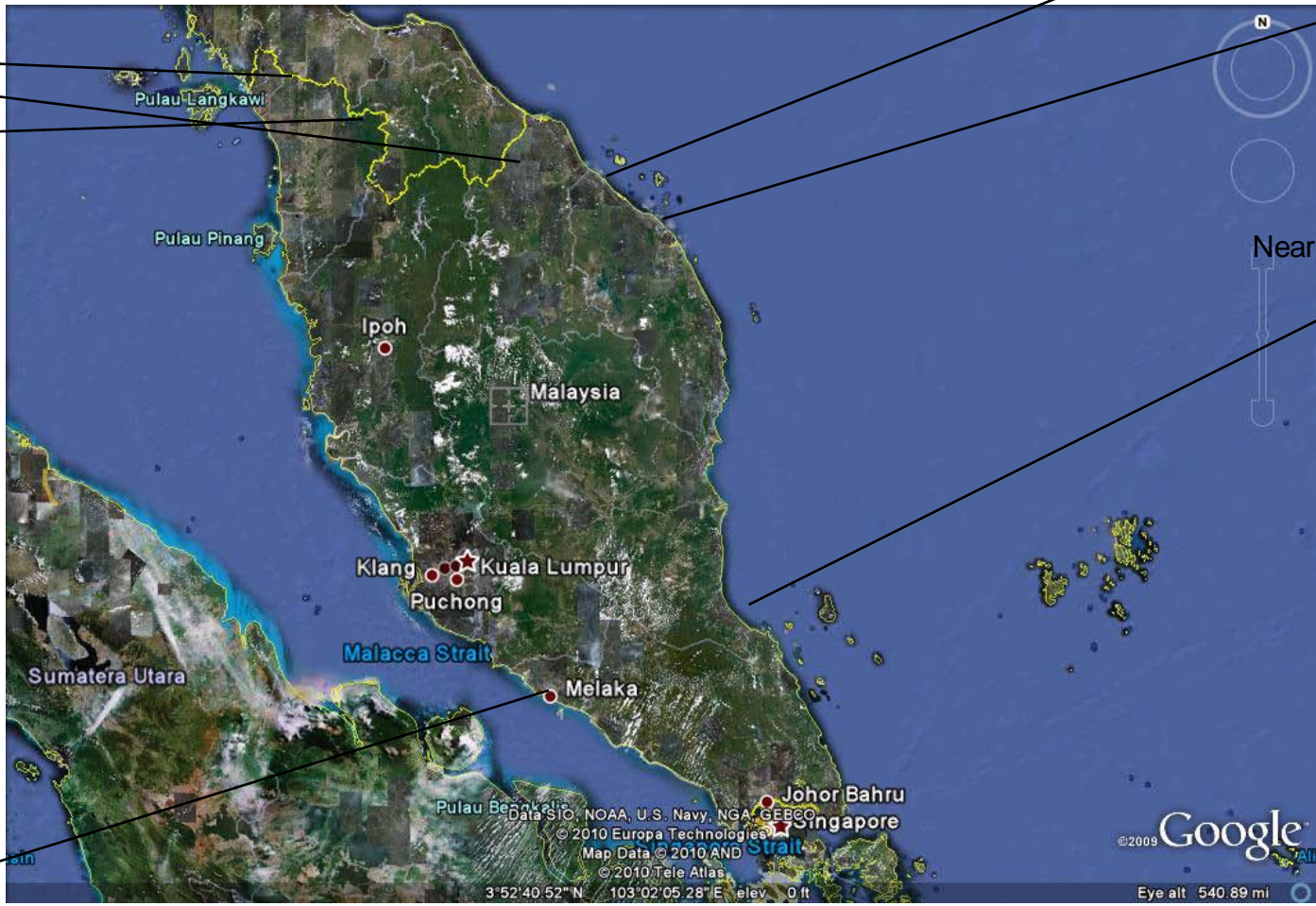
Nacelle Components



- | | |
|----------------------|---------------------------|
| 1. Hub controller | 12. Blade |
| 2. Pitch cylinder | 13. Rotor lock system |
| 3. Main shaft | 14. Hydraulic unit |
| 4. Oil cooler | 15. Machine foundation |
| 5. Gearbox | 16. Yaw gears |
| 6. Top Controller | 17. Generator |
| 7. Parking Break | 18. Ultra-sonic sensors |
| 8. Service crane | 19. Meteorological gauges |
| 9. Transformer | |
| 10. Blade Hub | |

Potential for wind park sites in West Malaysia

Along Malaysian-Thai Border



Kelantan

Terrenganu

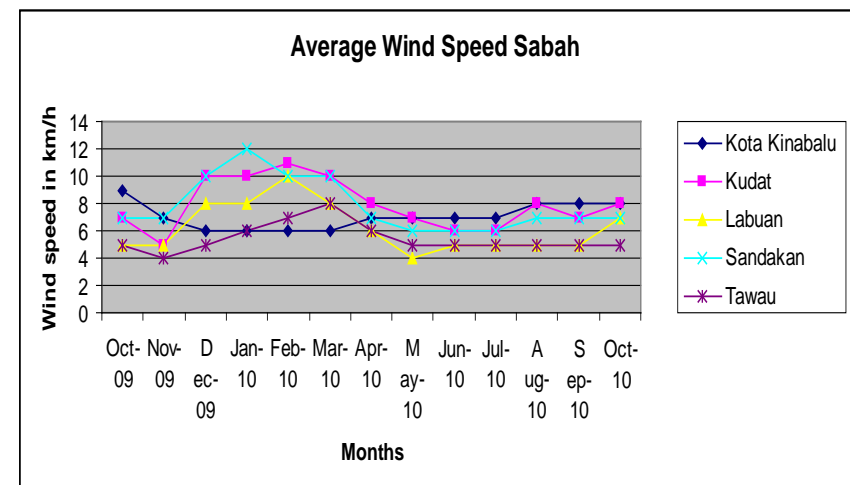
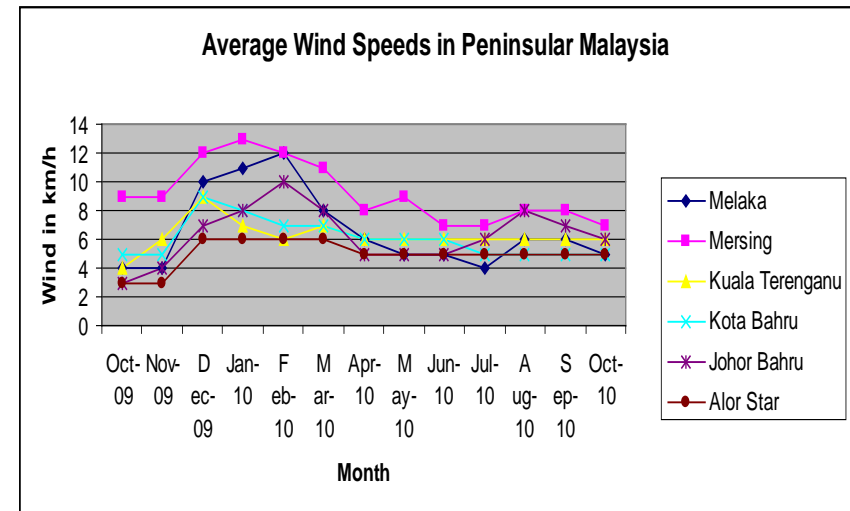
Near Mersing Johor

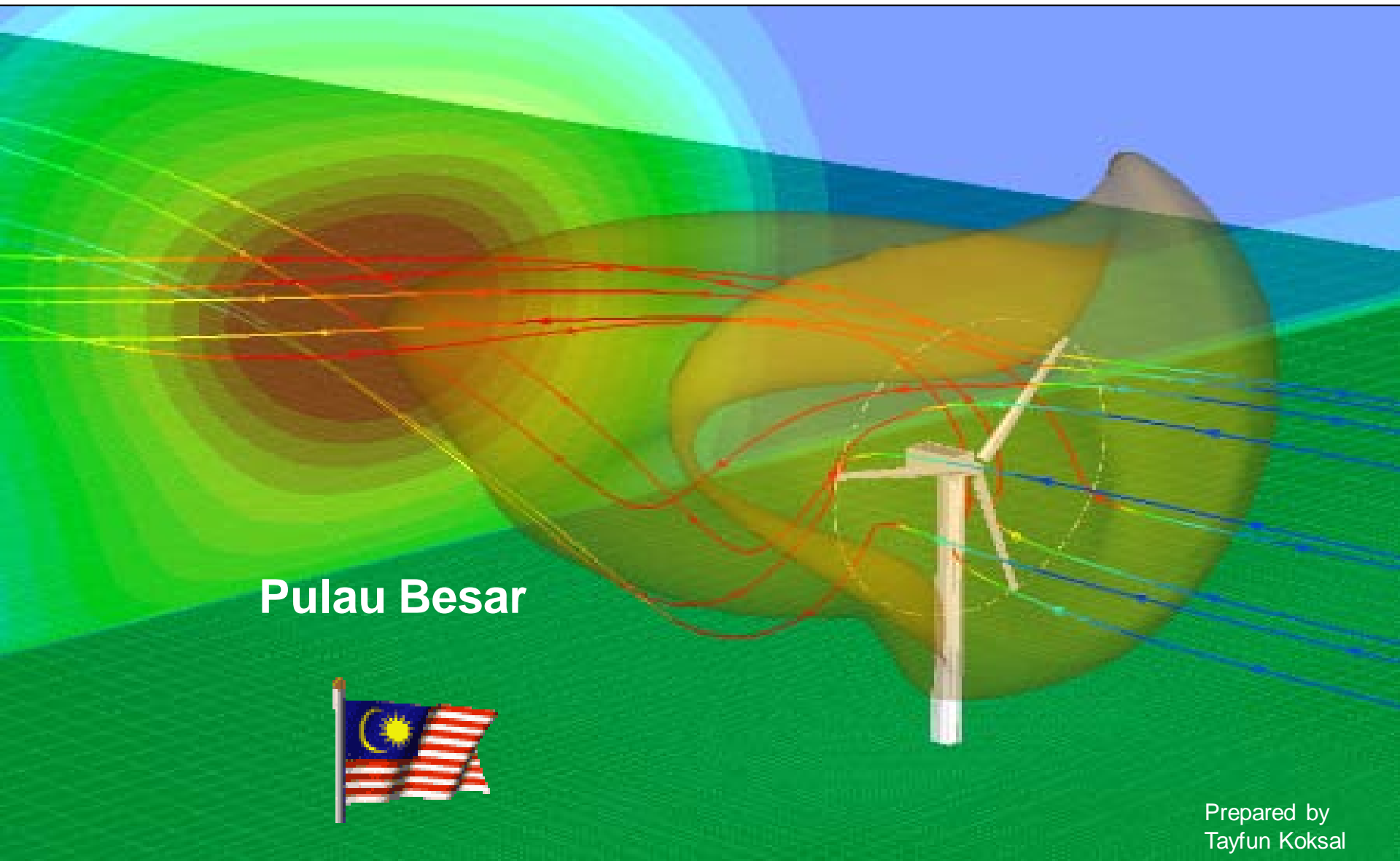
Malacca

Wind speeds in Malaysia

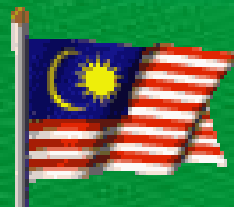


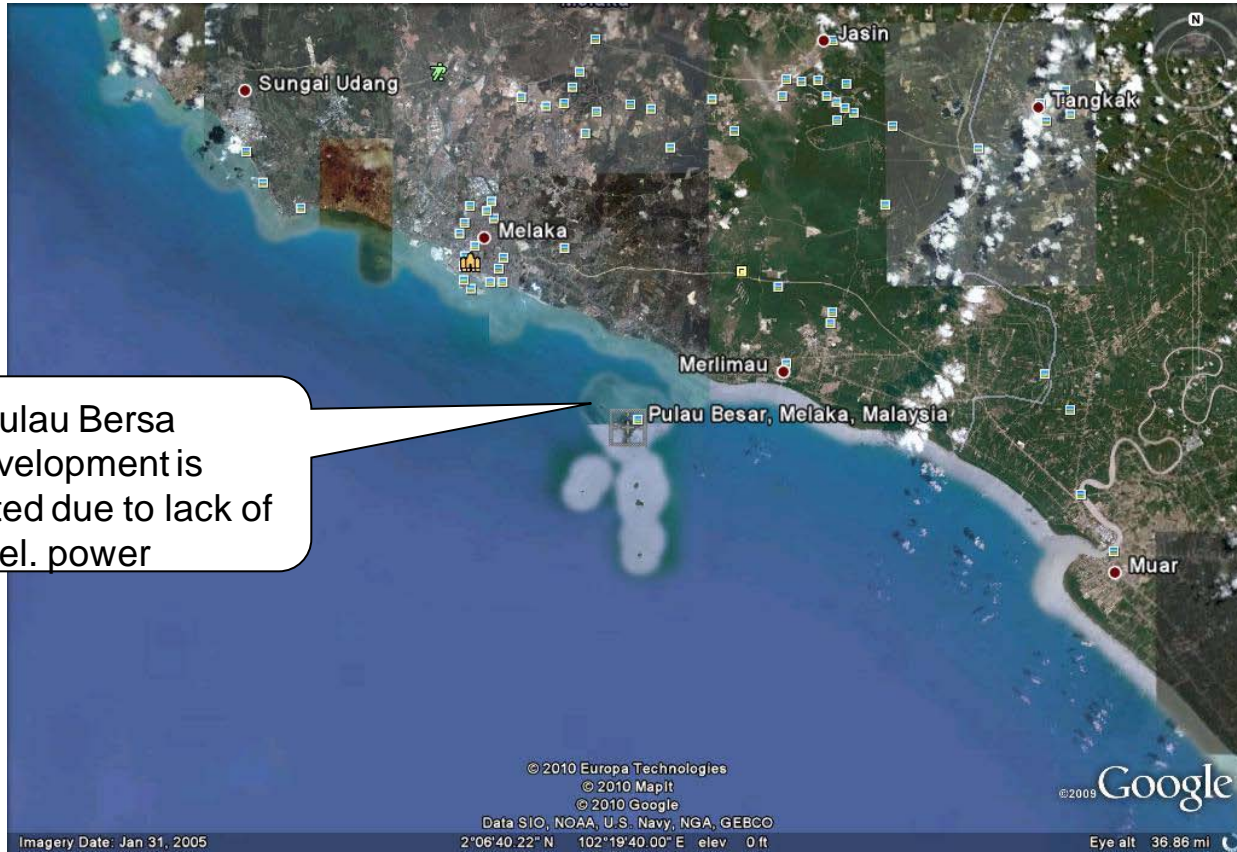
- Despite the fact that Malaysia being a tropical country does not have strong winds like countries in the Northern hemisphere there are several locations in Malaysia where wind energy is feasible.
- This clean energy can cover a part of the future energy mix of the country and contribute to a clean and green image of the country.
- Best locations in Peninsular Malaysia are Mersing and Melaka. In East Malaysia there are 3 locations where one or several wind parks would be feasible these are Kudat, closely followed by Sandakan and Kota Kinabalu
- We have made detailed wind measurements and summary reports on the actual hourly wind speed measured in Kudat Sabah over a period from October 2009 until Feb 2011
- In line with industry averages the proposed 18 MW wind park would produce approx, 30 mio kwh/year





Pulau Besar

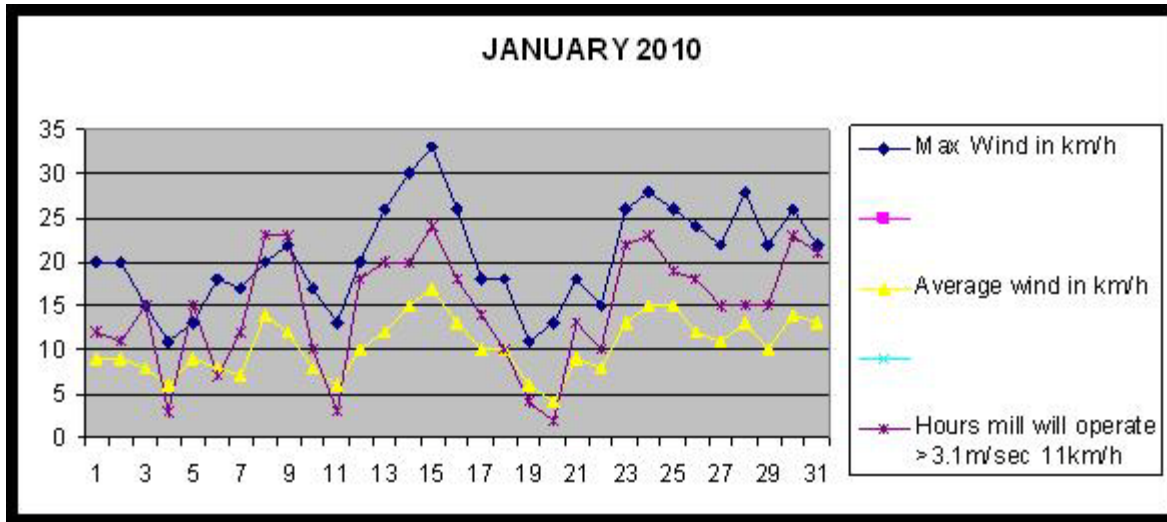




Possible Locations

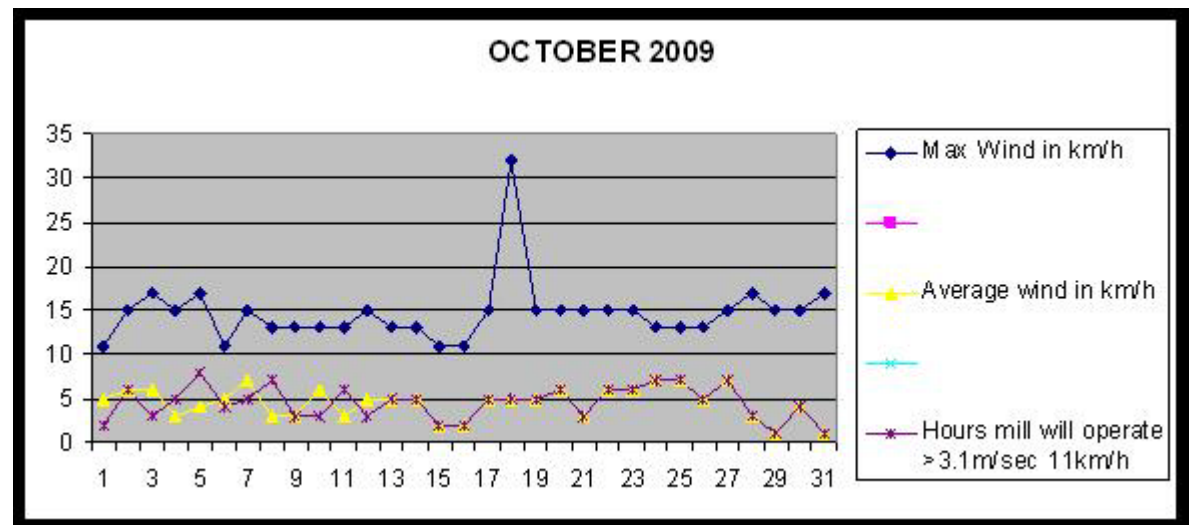


2 periods of Wind Strength

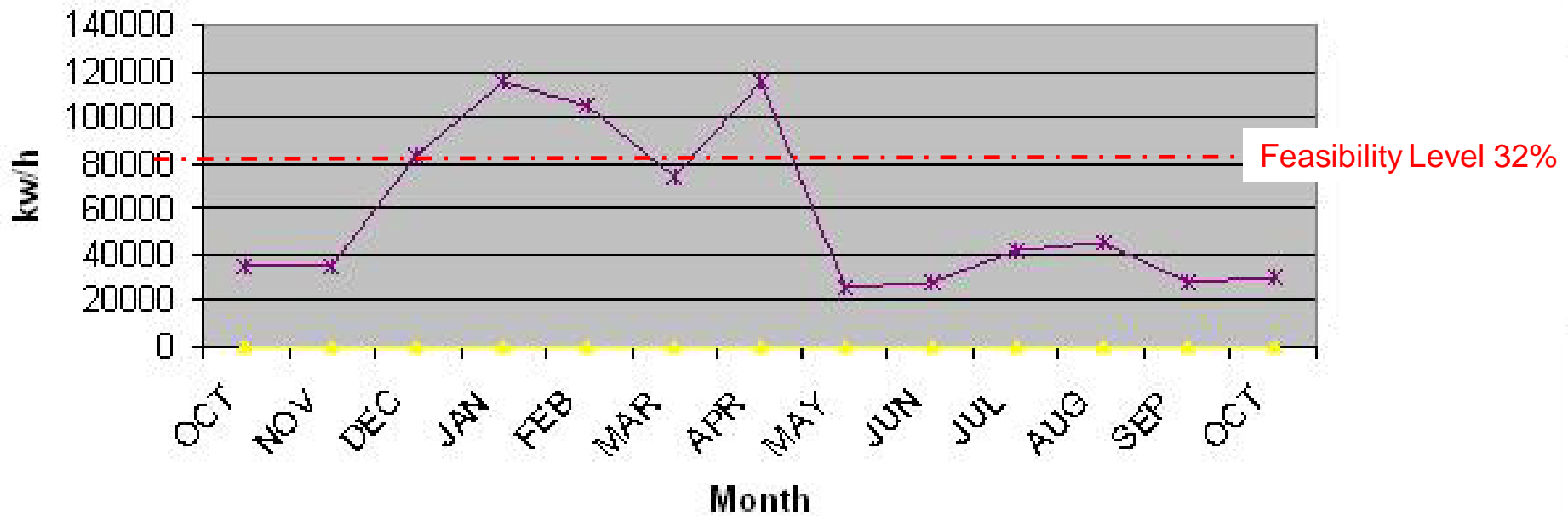


HIGH

LOW



Estimated output of 600kW wind turbine Pulau Besar



What do we Need?



- We need to start
- Equality of all energy mix potentials
- In feed tariff for wind
- locations for wind parks at feasible locations





**PRESENTATION ON THE PROPOSED POWER
TRANSMISSION VIA SUBMARINE POWER CABLE 11KV,
6MW LINKING BETWEEN MELAKA AND PULAU BESAR**

FOR

**UNIT PERANCANG EKONOMI NEGERI
JABATAN KETUA MENTERI MELAKA
TINGKAT 3, BLOK TEMENGGONG
SERI NEGERI, 75450 AYER KEROH, MELAKA**



28TH MARCH 2011

PRESENTATION CONTENTS

- 1) INTRODUCTION TO THE PROPOSED PROJECT
- 2) PROJECT OBJECTIVES
- 3) PROPOSED SUBMARINE POWER CABLE ROUTE
- 4) PROJECT BUDGETARY ESTIMATION
- 5) PROJECT COORDINATION & WAY FORWARD



1) INTRODUCTION TO THE PROPOSED PROJECT

- Melewar Integrated Engineering in collaboration with Siemens Malaysia has proposed the Melaka – Pulau Besar Power Transmission Project (6 MW, 11kV AC) for transmission of surplus electricity readily available to provide energy supply to Pulau Besar which occasionally suffering power shortages.
- The proposed Power Transmission System is made up of the following components:
 - Installation of approximately 5 kilometres of new Submarine power cable 11kV, 6 MW from Mainland, Melaka TNB substation to Pulau Besar substation.
 - Construction of one (1) new 11/0.415 kV, 6 MW Substation at Pulau Besar inclusive MV & LV switchgears, overhead onshore cables, transformer and all necessary accessories.



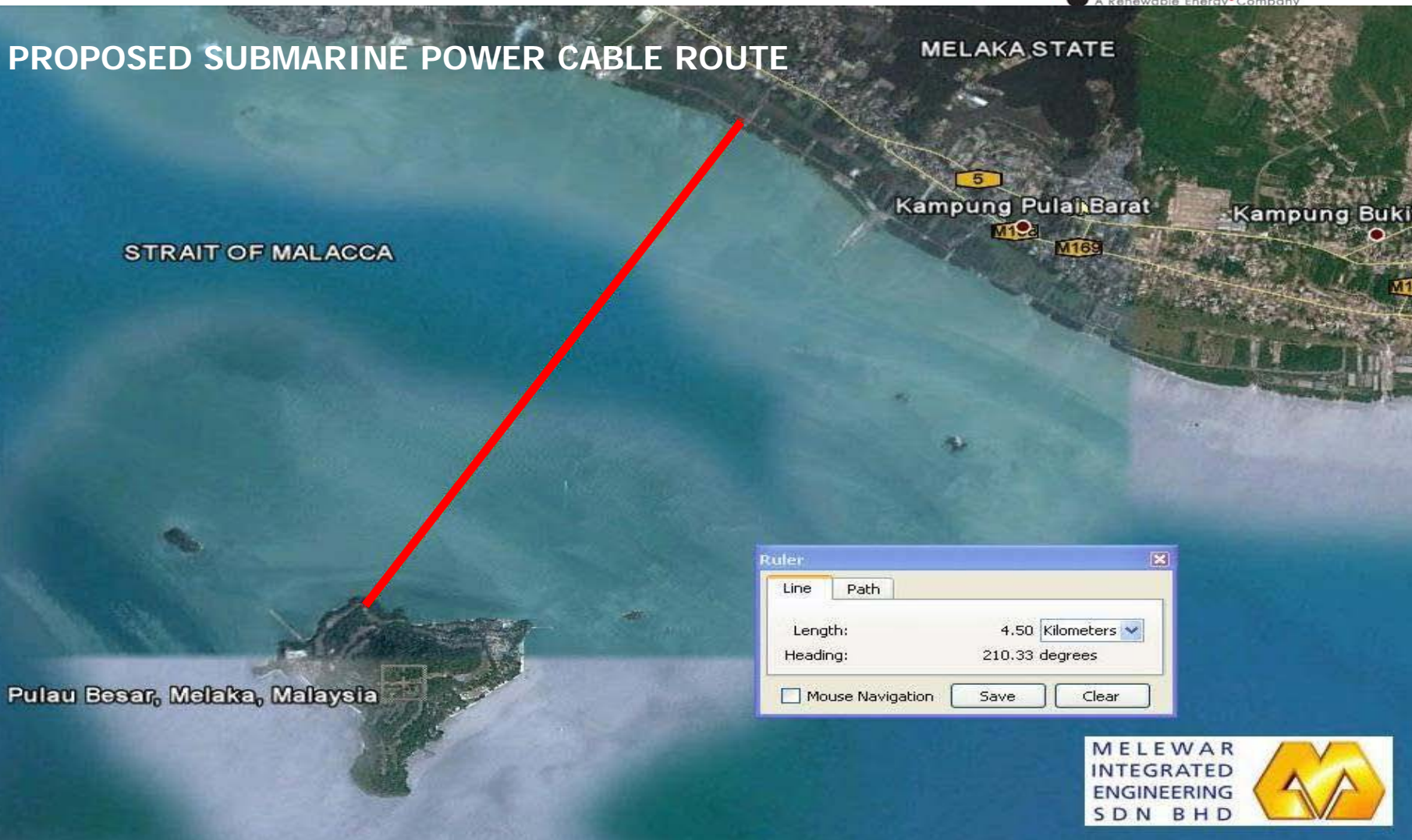
2) PROJECT OBJECTIVES



- Currently TNB provided 1,515 MVA of electricity to Melaka while its current consumer need was 563.3 MVA. Thus Melaka has abundant of energy capacity surplus and is expected to be sufficient to cater for Pulau Besar power consumption (~6 MVA) and the increased demands within Melaka for the next 50 years.
- It is more economically and feasibly to supply electricity from Melaka, mainland to Pulau Besar via submarine power cable rather than building a new 6 MW Solar Power Station which the actually capital investment is 4~5 times more than laying the underwater cable.
- Supplying sufficient and stable electricity to Pulau Besar will certainly encourage the growth of tourism on the island.
- This power transmission project is in-line with further development for Pulau Besar to turn this island into the country's largest independent oil storage terminal.
- The routes involve minimal environmental impacts, as practical.



3) PROPOSED SUBMARINE POWER CABLE ROUTE



4) PROJECT BUDGETARY ESTIMATION

- The following shall be the budgetary price estimation :-

Category	Item	Estimated Price In RM 'Mil
Environmental and Property	Acquisition of designations and resource consents and valuation and legal advice for submarine cable.	0.8
Submarine Power Cable 11kV AC, 6MW	Submarine power cable 11kV AC 50Hz, 6 MW from Mainland, Melaka S/S to Pulau Besar S/S.	7.6
Erection / Installation of Submarine Power Cable	a) Cable Tank for storage and installation. b) Shipment and laying of submarine power cable.	12.2
11/0.415kV, 6MW Substation	One (1) new 11/0.415kV, 6MW Substation at Pulau Besar.	3.6
Project Management and Overheads	Includes detailed engineering, maintaining a project office, consultant engagement and administration costs.	1.3
GRAND TOTAL		25.5

5) PROJECT COORDINATION & WAY FORWARD

- Letter of intent and support by Ministry of Energy of Malaysia
- Letter of intent and support by UPEN Jabatan Ketua Menteri Melaka
- Undertake a preliminary feasibility study and study of route survey
- Prepare Memorandum Of Understanding – MOU and Budget
- Selected members would execute the MOU thereby committing to the development of the project
- MOU will require some form of financial commitment to progress the project further
- Essentially, the signing of the MOU will be the “Kick – Start” of the proposed project



TERIMA KASIH

