

# **Kick off Meeting**

**15-18 March 2005**

**Manila, Philippines**

**Department of Energy Technique  
Ministry of Industry, Mines and Energy**

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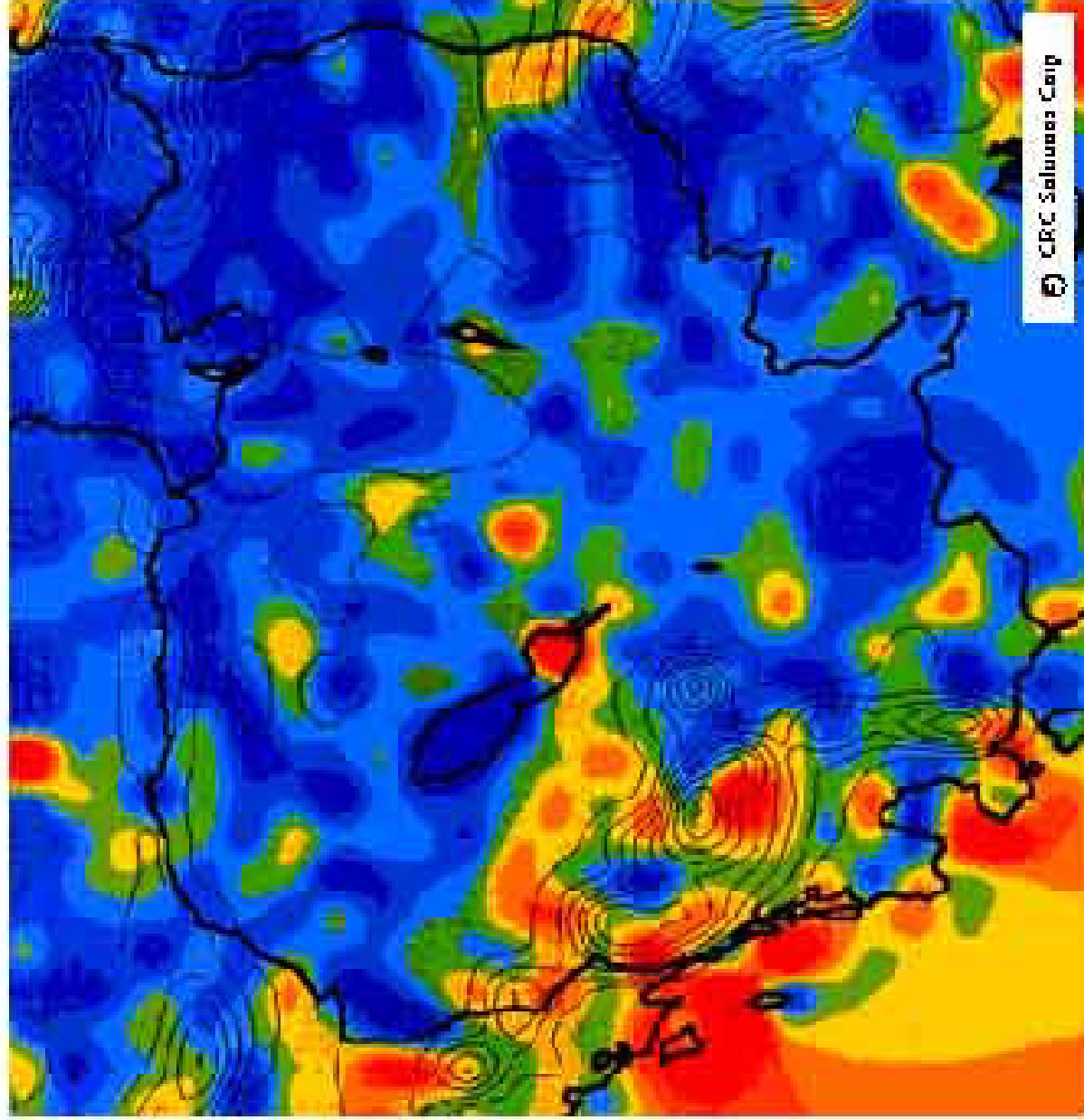
# 1. Introduction

Cambodia is located in the southern part of Indochina Peninsula (approximately north latitude 10 degrees to 15 degrees and east longitude 102 degrees to 108 degrees) and has an area of about 181,035 km<sup>2</sup>. To the north are Thailand and Laos, and to the east and south it borders Vietnam. In the west it touches upon the gulf of Thailand and the country itself.

## 2. Renewable Energy Use

Renewable energy includes solar, wind, biogas, micro hydropower generation and biomass.

	Areas of use	Operational form
Photovoltaic power generation	. All Cambodia	. Since fluctuation are great, it is not suitable for base running functions
<b>Wind power generation</b>	. <b>Coastal regions seem promising</b>	. <b>Since fluctuation are great, it is not suitable for base running functions</b>
Micro hydropower generation	. Areas with large amounts of water resources, villages near rivers	. Suitable for base operation . Change according to season
Biomass energy power generation	. Selected region	. Suitable for base operation



(mm)  
precipitação



## 2.1 Institutional situation

The Energy Technique Department in Ministry of Industry, Mines and Energy (MIME) is the only entity which specifically deals with in the Renewable Energies Sector. This department conducts many duties:

Setting up pilot projects for community systems (schools, health centers, pagodas, training centers, battery-charging stations, public lighting, etc..) in cooperation with numerous national and international organizations (Sida, NEDO, FONDEM, etc..) Development of low-cost components, Extensive participation in national and international seminars and university networks.

For time being, there is no special advantage for renewable energy at this time. It is subject to a 35 % import duty, plus 10 % VAT. We Study the possible import duty and tax exemption for equipment which will be used in rural electrification projects.

## **The Telephone Market**

The source information collected from Khmer Solar Company, the Telephone company Samart has already set up about 5 sites of 400 Watts wind turbines, totaling 8 kW at Koh Kong province. Koh Kong province is located in the coastal region that has the wind condition suitable with the performing of the wind turbine, annual average wind speeds of 5 m/s.

## Public Infrastructures

This market accounts for approximately 5 kW until now, on project funded by international NGOs. These projects focus mainly on schools and health centers. Currently, the main application focuses on water pumping using hybrid system (Solar & wind combined ). Due to the duration of wind flow was limited and lacking of the wind condition data for investigation before installation of the systems, so now some of wind power systems were not well performed and removed.



## Wind Power for Pumping

There are a very small number of individual households and farm wind pumps have been installed for water pumping. In general, mechanical wind pumps require relatively large starting torque at low speed, and then the wind turbine type has a limit for adoption. The multi-blades wind turbines has excellent low wind speed performance. They are able to begin pumping at wind speeds as low as 2.5 m/s and they reach their peak efficiency in the range of 4 to 7 m/s. Mechanical wind pumps are probably the best choice for using wind energy when the annual average wind speed is less than 4 m/s.

## Domestic Electrification

It is possible that some opportunities for small wind power systems, or individual household wind power systems may be found in some areas, particularly along the south-west coast and adjoining the Cardamom mountains, or in the high land country along the Vietnam border. There are anecdotal reports that winds off the Tonle Sap can be strong, although the duration of such winds may be limited. We also understand that a few individual household wind power systems have been installed in the country, but data on these systems could also not be obtained.



## Battery Charging

Each charging station has been made available free of charge for a group of 7 families, with each family also receiving a mobile lighting system made up of a 90 Ah battery and 7 Watts tester.

The families bring their 90 Ah battery in for charging once a week (1 day / family). The cost of charging was been set at 200 Riels (5 US Cent), which is 5 times cheaper than the rate charged by the battery charger in the same village.



### **3. Key Barriers**

Major barriers exist in Cambodia impeding the development of wind power generation for rural application. These barriers can be summed up as follows:

- \* General lack of awareness and political support
- \* Lack of policy and legal framework
- \* Lack of resource potential (wind site data)
- \* Lack of information on market characteristics,
- \* Access to financing of renewable energy devices with high front-end cost
- \* Institutional capacity for planning, implementation and maintenance

# Sites Proposed for Wind Power

# Wind Power Site Information

## #1. Sihanouk Vile:

10 38.170'N  
103 31.134'E  
Approx. 130 m Altitude

## #2. Kampot Province: (Bokor)

10 37.342'N  
104 1.592'E  
Approx. 1,080m Altitude

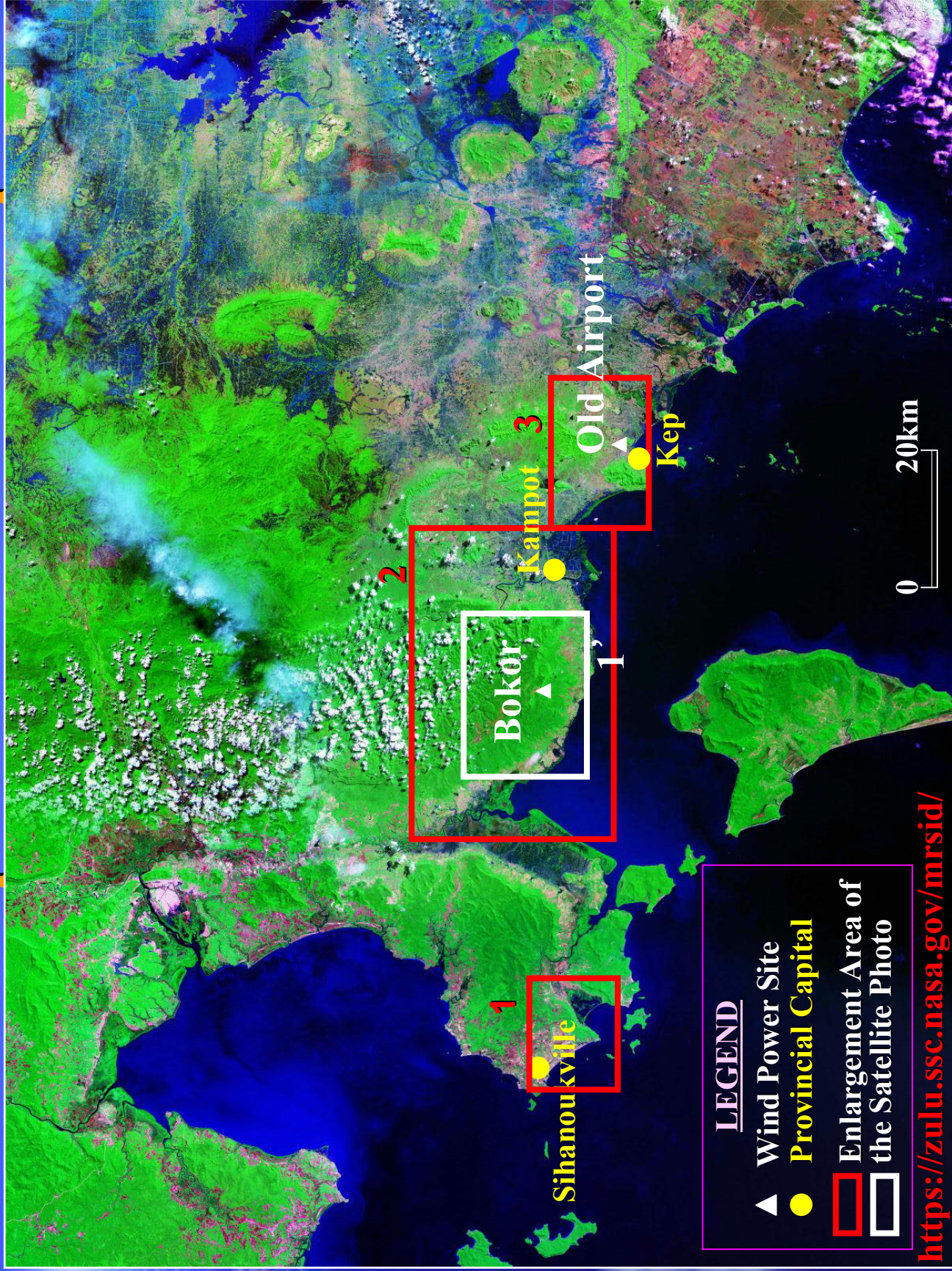
## #3. Kep Vile: (Old Airport)

10 32.4'N  
104 21.3'E  
Approx. 30m Altitude





# Site Aspects at Bokor & Kep



# Precipice of Bokor plateau

## Relay Stations



**The anemometer can be installed in the steel towers which are used the relay station.**

**An efficient observation is possible by the data transfer which uses the cellular phone.**

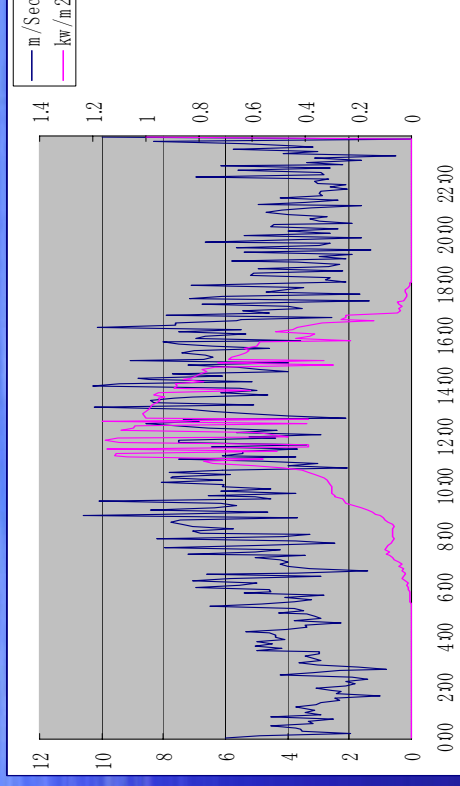
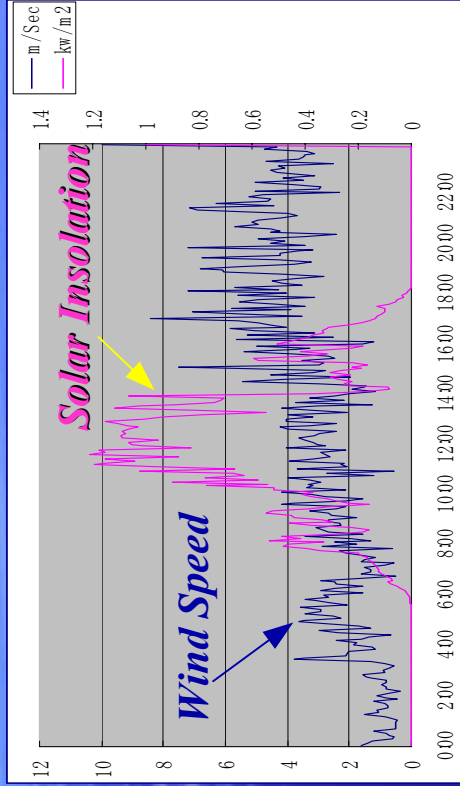
# Meteorological Data

(Sihanoukville; Sep., '03~Aug., '04)

[Rainy Season]

1st Sep., 2003

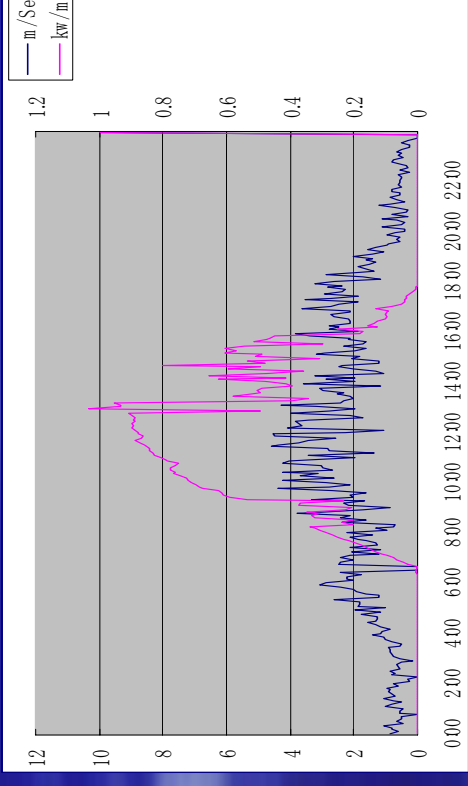
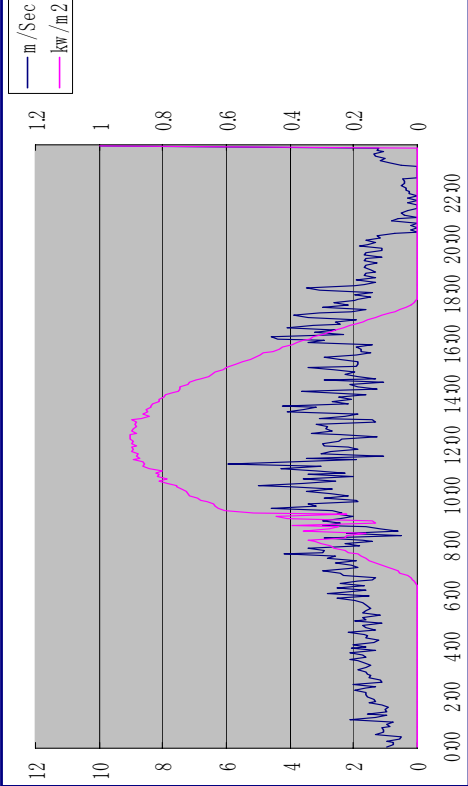
2nd Sep., 2003



1st Jan., 2003

[Dry Season]

2nd Jan., 2003



## 4-Recommendations

Wind energy is relatively new to Cambodia. Wind conditions data in a complete set is not available anywhere in Cambodia. Therefore it is a need for relevant institutions in wind energy to build up their own database for use in wind power. Throughout the country, should be studied of specific wind condition to have accurately data for developing wind power generations.

Proper selected wind turbines follow the wind condition data have been collected.

Further investigations will be required to define the wind resource, before any wind power program can be considered.