



**The Waste Incineration Research Center**

# Mission

Set up since December 1997 with funding from King Mongkut's University of Technology North Bangkok, the mission of the Waste Incineration Research Center is to provide fundamental and applied research, professional services and consultancy to industry and government in the areas of waste disposal through thermal means, as well as efficient and clean use of energy.

# Goals

- 1 To develop core competencies in research and development, as well as design and analysis in the areas of thermal processes for the disposal and utilization of waste, and for efficient and clean use of energy.
- 2 To serve community, industry and government in matters concerning waste incineration and utilization, and clean use of energy through the provision of scientific information, advice, training, testing and diagnostics as well as design services.
- 3 To provide an excellent education and research environment for graduate thesis work, and to stimulate and prepare students to choose combustion science and engineering as a major field for study.
- 4 To foster greater awareness and understanding on the effects of human and engineering activities to the environment and the alternatives for their solution, particularly in the areas of waste disposal.



# Fundings

Approximately 1,000,000 US\$ grant obtained since 1998 from various sources



KMUTNB  
มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าพระนครเหนือ



Bureau Of The Budget  
สำนักงบประมาณ



Energy Policy and Planning Office  
สำนักงานนโยบายและแผนพลังงาน



Pollution Control Department  
กรมควบคุมมลพิษ



Thailand Research Fund  
สำนักงานกองทุนสนับสนุนการวิจัย



Ministry of Energy  
กระทรวงพลังงาน

# Staff



Assoc. Prof. Somrat Kerdsuwan, Ph.D.

**Research topics**

Waste thermal treatment process, Air pollution control



Assoc. Prof. Bundit Fungtammasan, Ph.D.

**Research topics**

Combustion of a liquid waste containing high proportion of oxygen and nitrogen, Fuel-oxidant mixing on combustion efficiency and pollutant formation



Asst. Prof. Pумыos Vallikul, D.Sc.

**Research topics**

Combustion diagnostics (Tomography), Fire dynamics, Computer simulation on mechanical engineering



Asst. Prof. Suthum Patumsawad, Ph.D.

**Research topics**

Thermal conversion processes



Asst. Prof. Krongkaew Laohalidanond, Dr.-Ing.

**Research topics**

Thermal treatment process of waste and biomass

# Co-operation



## » Local Co-Operation



Joint Graduate School of Energy and Environment (JGSEE)



Pollution Control Department



The Engineering Institute of Thailand Under H.M. The King's Patronage



Phuket Municipality



Suratthani Municipality

## » International Co-Operation



Laboratoire de Combustion et de Detoniques (CNRS-France)



Laboratoire Gestion des Resque et de Environnement, Universite de Haute Alsace (France)



Laboratory of Combustion, University of Maryland (USA)



Division of Energy & Furnace Technology, Royal Institute of Technology (Sweden)



Yoshikawa Laboratory, Tokyo Institute of Technology (Japan)



Nagoya University (Japan)



# Research and Development

The Waste Incineration Research Center has emphasized on the research topic of “*Biomass and Waste Treatment for Heat and Power Production*” with the target to develop and construct the decentralized 1-MW small scale power plant from Municipal Solid Waste (MSW) and biomass residues in the community. The level of research are in the followings:

1. Research in Bench scale
  - Fixed bed reactor for gasification and pyrolysis process
  - Fluidized bed gasifier
  - Massspectrometer
2. Research in Lab scale
  - Rotary kiln
  - 10 kg/hr fixed bed downdraft gasifier
  - Bomb calorimeter
  - Temperature measuring device
  - Tar sampling unit
  - Gas anslyzer
3. Research in Prototype scale
  - 50 kg/hr fixed bed downdraft gasifier
  - Producer gas cleaning unit
  - RDF preparation unit
  - Dual fuel engine-generator



# Services



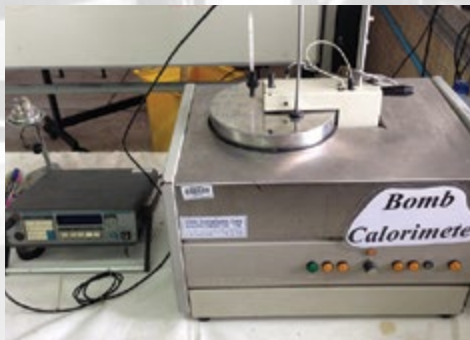
## Technology Transfer

- Incinerator design
- Training/seminar on waste incineration

## Testing/consultancy

- Combustion diagnostics
- Waste characterization
- Waste incineration project development

# Facilities



## Rotary Kiln Incinerator

50 kg/hr of Destruction Capacity  
100 kg/hr of Destruction Capacity

## Waste Characterization

Bomb Calorimeter  
Boiler Calorimeter  
Moisture Testing



## Portable Gas Analyzers

O<sub>2</sub>  
CO (up to 400,000 ppm)  
SO<sub>2</sub>  
NO  
NO<sub>2</sub>

## Gas Analyzers

O<sub>2</sub> (paramagnetic)  
CO  
CO<sub>2</sub>  
NO<sub>x</sub>  
SO<sub>2</sub>(NDIR)  
THC (FID)



## Fixed Bed Gasification Reactor

High Temperature  
Air Combustion Incinerator

Temperature,  
flow and pressure sensors

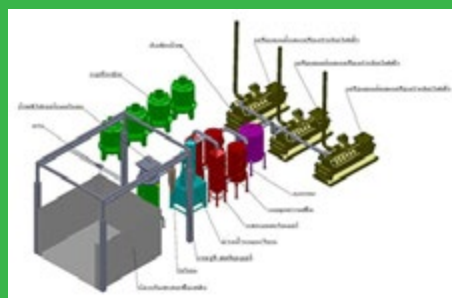
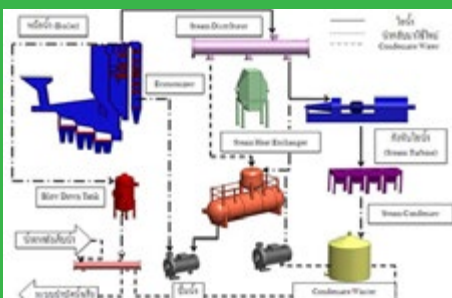
CFD software FLUENT  
Finite Element ABAQUS  
Aspen Plus® Program

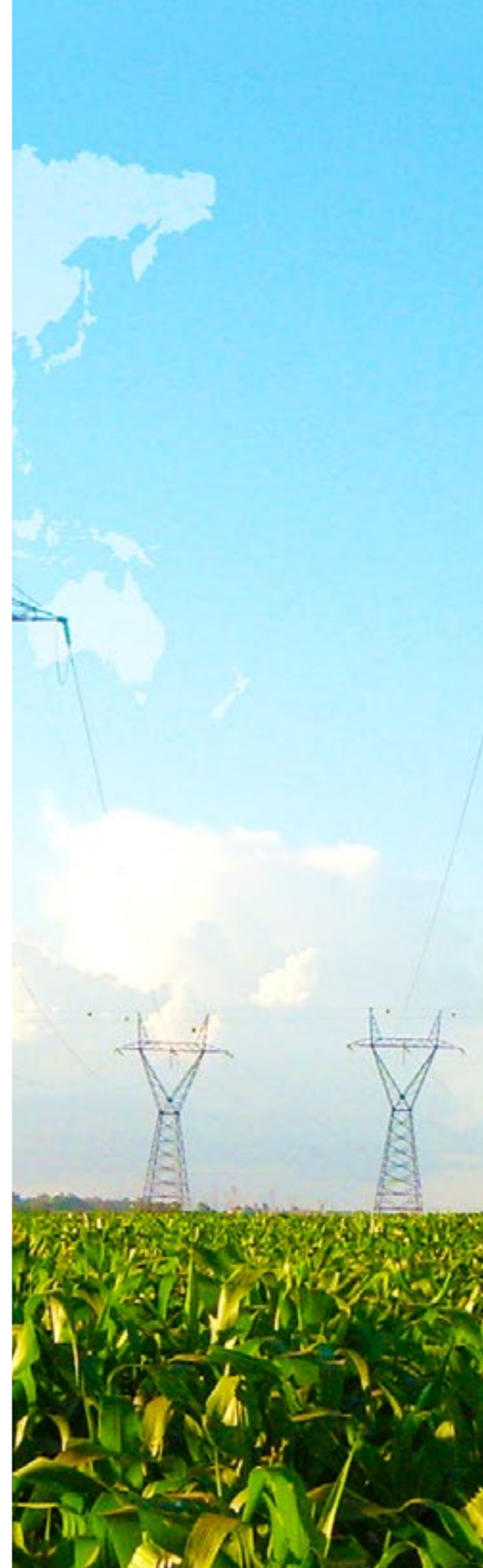
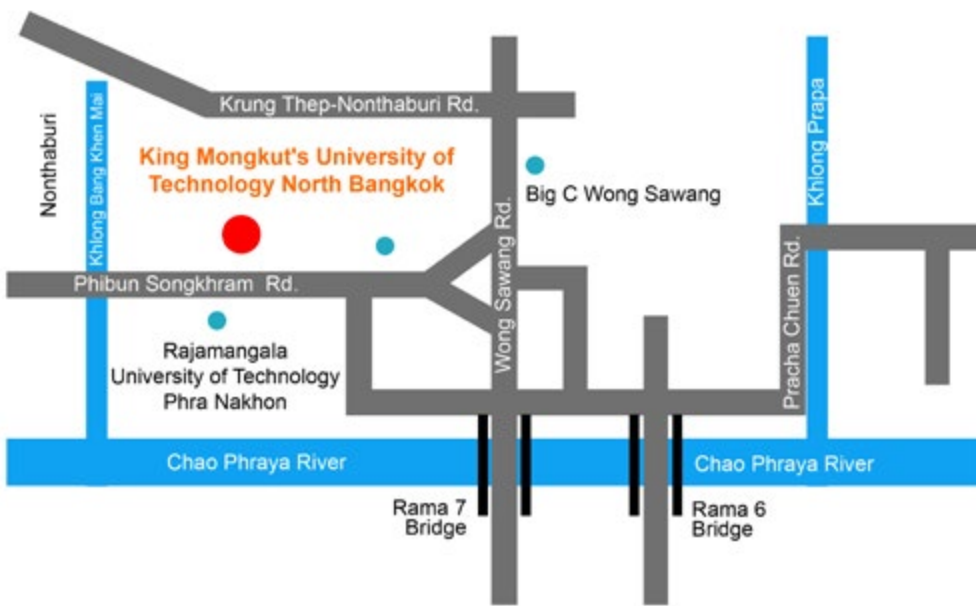
Laser Doppler Anemometry: 3-D

# Experiences

Since 1997, our WIRC have conducted hundreds projects in the areas of thermal processes for the disposal and utilization of waste, and for efficient and clean use of energy. The followings are the projects conducted in the recent years.

1. Consultancy for the Construction of 300 Ton per Day MSW Incineration Plant at Nhong Kham Waste Management Center, Bangkok
2. Feasibility Study of the Improvement and Operation of the Existing Municipal Solid Waste Incineration, Bangkok
3. Development and Technology Transfer for Pilot Scale of 1 MW Distributed Biomass Power Plant
4. Consultancy for Detail Design and Budget Estimation for Improvement of Phuket Waste Management Center
5. Feasibility Study of Waste to Energy for Udonthani Province
6. Feasibility Study of Municipal Solid Waste Management for Pha Ngan District, Surat Thani
7. Feasibility Study of Waste to Energy Project for Thailand, A Case Study of Krabi Municipality
8. Clean Technology Development for the Industry in Rayong
9. 3R Innovation Development for Material Recovery from Industrial Waste in Puthumthani
10. Feasibility Study of the Development of the Integrated Waste Management Center, Chonburi





## Contact

The Waste Incineration Research Center  
 Department of Mechanical and Aerospace Engineering  
 Faculty of Engineering  
 King Mongkut's University of Technology North Bangkok  
 1518 Pracharat Sai 1 Rd., Wongsawang, Bangsue, Bangkok, 10800, Thailand.

Tel. 66 2 555 2000 Ext 8324  
 Email : [srk@kmutnb.ac.th](mailto:srk@kmutnb.ac.th), [krongkaewl@kmutnb.ac.th](mailto:krongkaewl@kmutnb.ac.th)