

# Thailand's Power Generation Mix

**Presentation to:  
Thai Gas Market 2007**

**Bangkok  
Friday, 16 November 2007**

# Agenda

---

- ❖ **Thailand's Power Generation Market**
- ❖ **Power Generation Options and the PDP 2007**
- ❖ **Challenges, Opportunities, and Future Directions**

# Thailand's Power Generation Market

# Current Situation

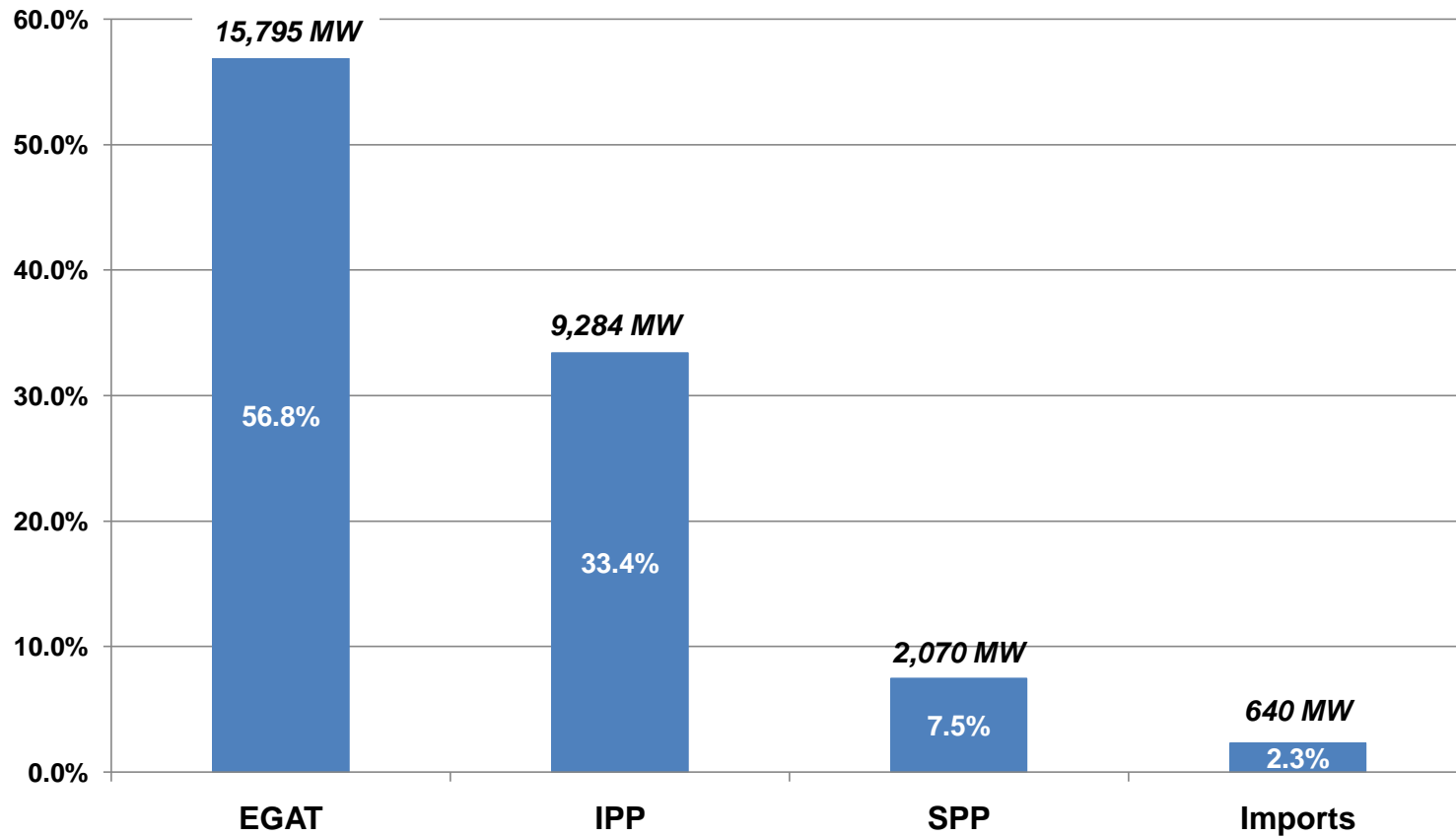
---

- ⚠ **Peak Load ~ 22,586 MW (April 2007)**
- ⚠ **Total Installed Capacity ~ 27,788 MW**
- ⚠ **Reserve Capacity ~ 23%**
- ⚠ **EGAT the dominant generator (and single buyer)**
- ⚠ **Natural gas the largest fuel source**
  - ⇒ **Accounting for approximately 50% of installed capacity**  
**...but 65-70% of generation**

# Share of Installed Capacity

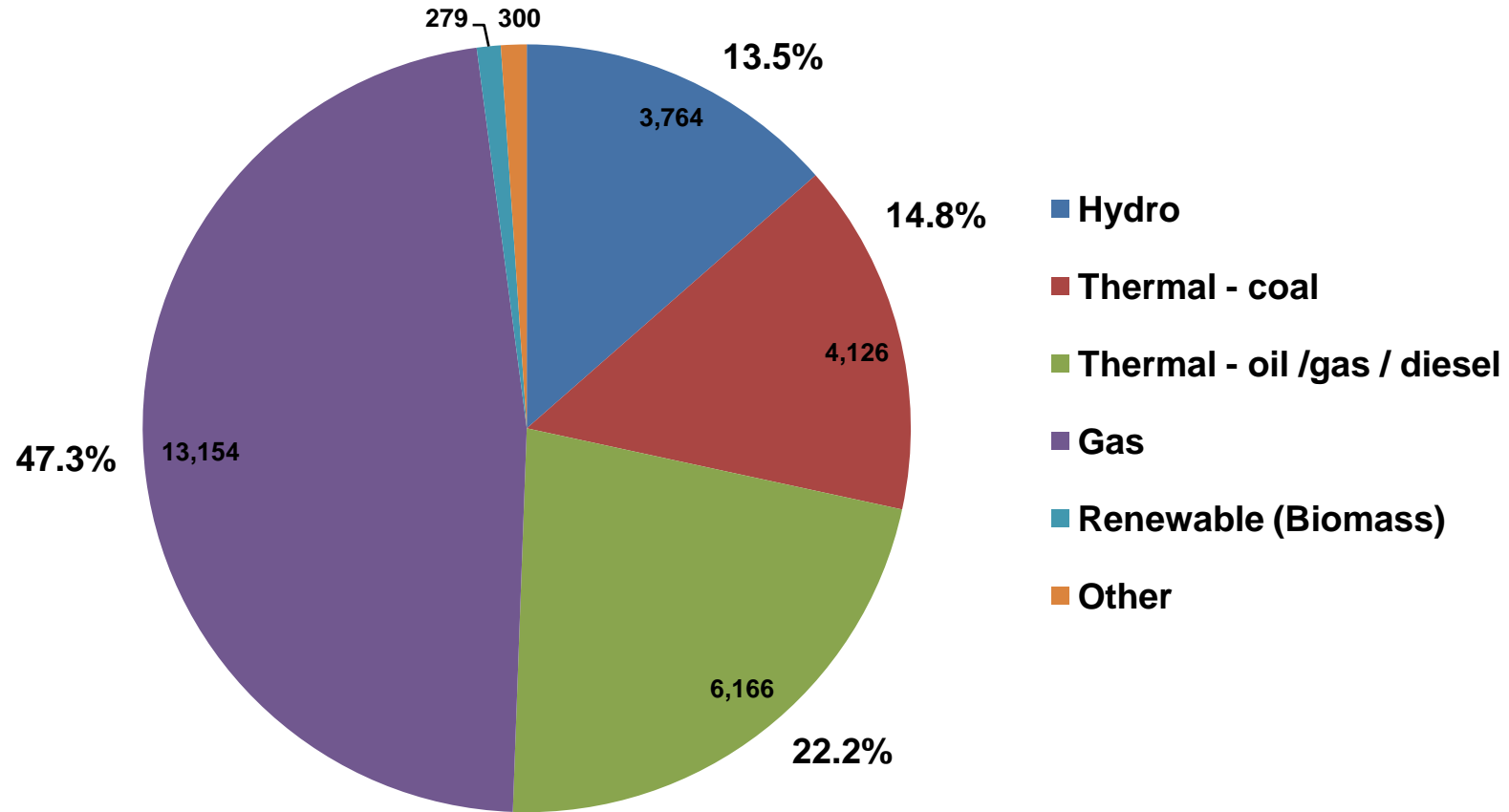
---

Installed Capacity 2007 (%)



# Installed Capacity by Fuel Type

2007 Total Installed Capacity (27,788 MW)



# Power Generation Options and the PDP 2007

# Energy Mix Considerations/Drivers

---

- ▣ **Cost**
- ▣ **Energy diversification**
  - ⇒ Energy security
  - ⇒ Energy diversity
  - ⇒ Foreign exchange impact
- ▣ **Environmental issues**
  - ⇒ Greenhouse gas (GHG) impact
  - ⇒ Local air quality
- ▣ **Community participation**
  - ⇒ Domestic employment
  - ⇒ Contribution to community development

# Power Generation Options

---

## ❏ Conventional (fossil) fuels

- ⇒ Coal
- ⇒ Gas
- ⇒ Fuel oil / diesel

## ❏ Hydro

- ⇒ Large (impounding)
- ⇒ Run-of-river

## ❏ Imported energy

## ❏ Nuclear

## ❏ Renewable energy (traditional)

- ⇒ Biomass
- ⇒ Wind
- ⇒ Waste-to-energy
- ⇒ Solar (photovoltaic / thermal)

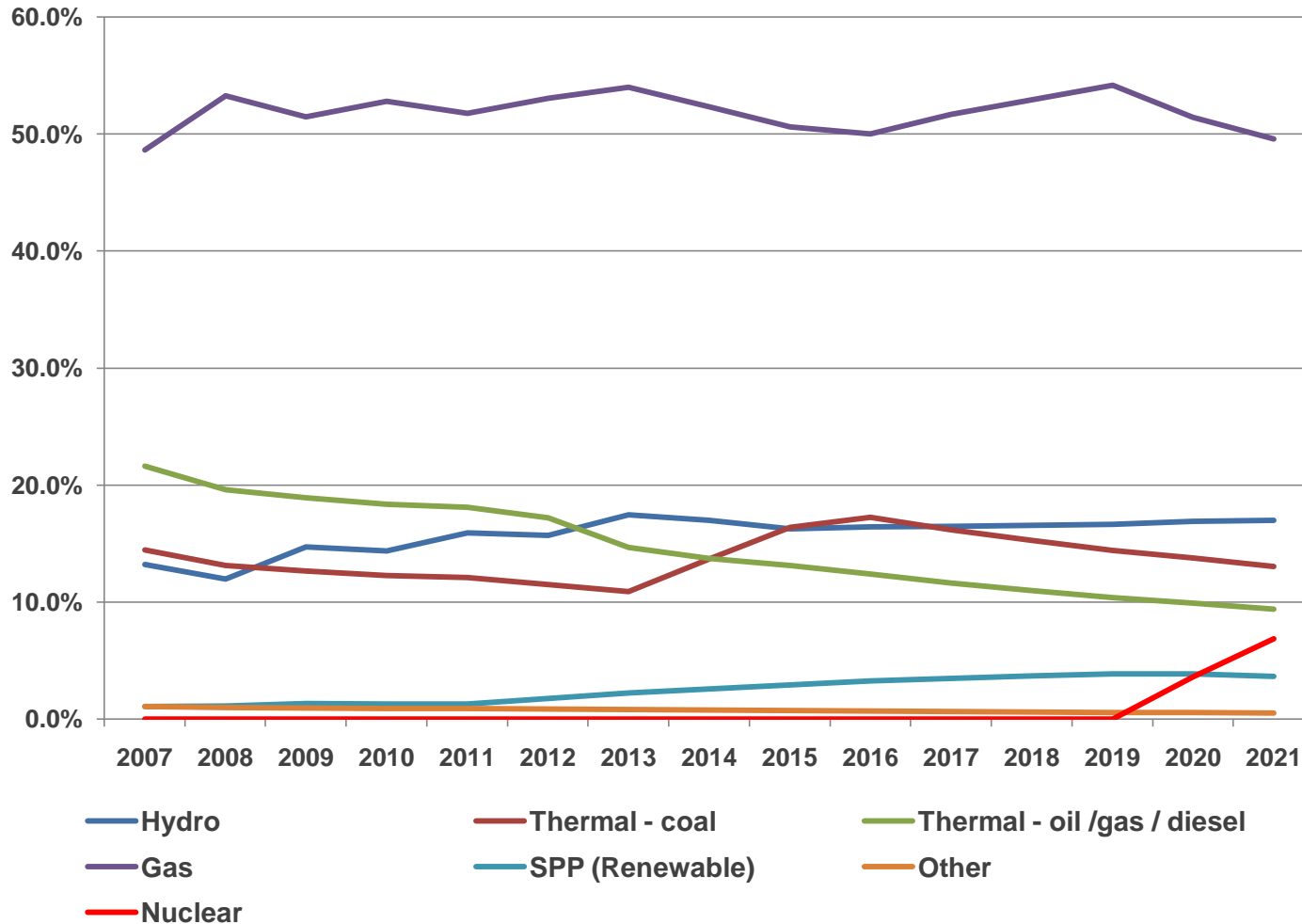
## ❏ Renewable energy (non-traditional)

- ⇒ Ocean energy (wave / tidal)

## ❏ Carbon Reduction

- ⇒ Carbon capture and storage (CCS)
- ⇒ Fuel conversion (e.g. coal gasification)

# PDP 2007: Generation Mix



Source: EGAT PDP 2007 Recommended Plan. Assumptions made regarding timing of coal plant build. Imports assumed to be from hydro plants.

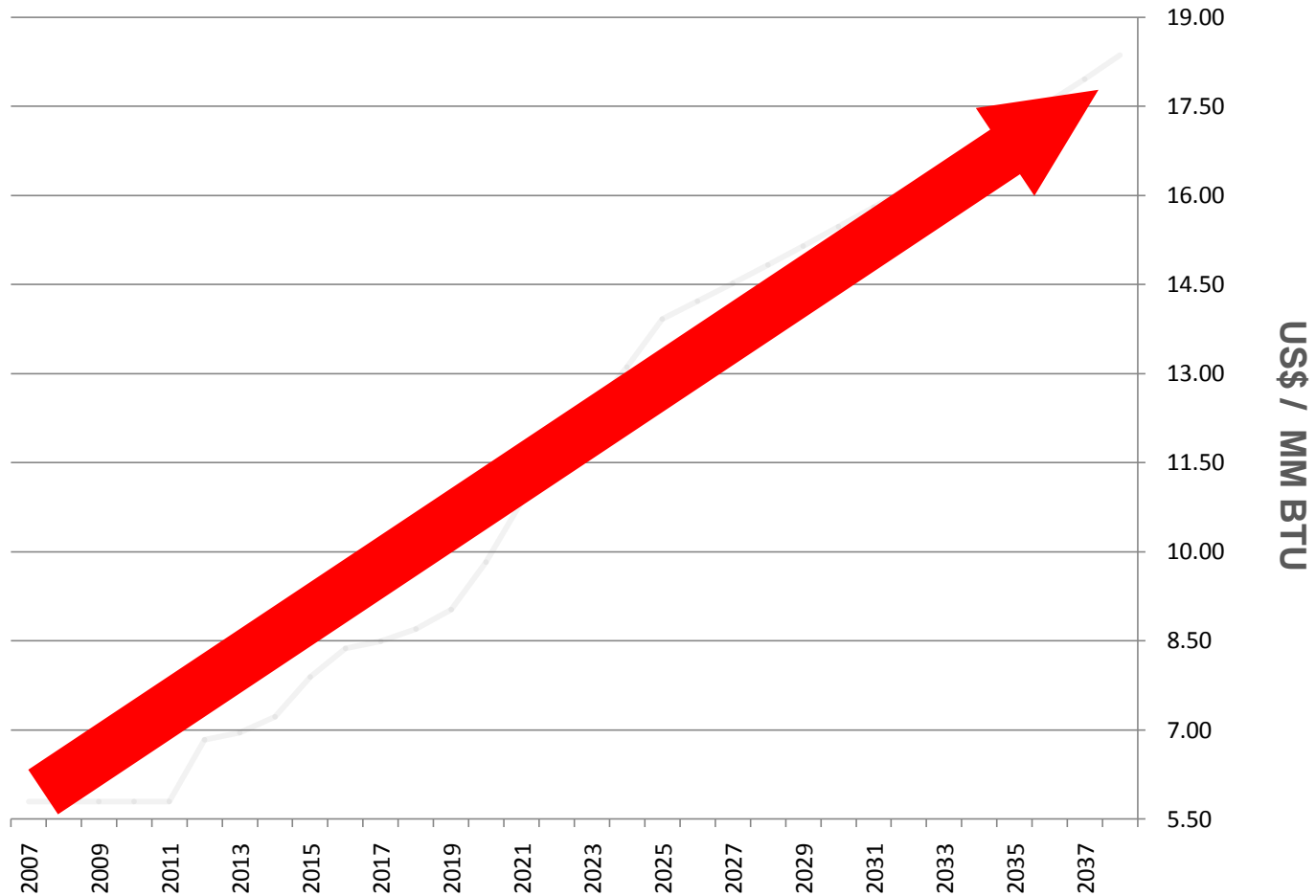


# Going Forward: PDP 2007

---

- ❖ **Total added capacity of 39,000 MW to 2021**
  - ⇒ i.e. about 140% of present capacity
- ❖ **Natural gas / LNG continues to be the core of energy mix**
  - ⇒ With a C. 50% share of installed capacity; larger proportion of generation
  - ⇒ Depleting domestic resources
  - ⇒ Therefore import LNG...
- ❖ **Need to develop 2 x 5 Mtpa LNG terminals during PDP plan period**
  - ⇒ At a time of tight regional gas / LNG supply
  - ⇒ High and (apparently) rising global energy commodity prices

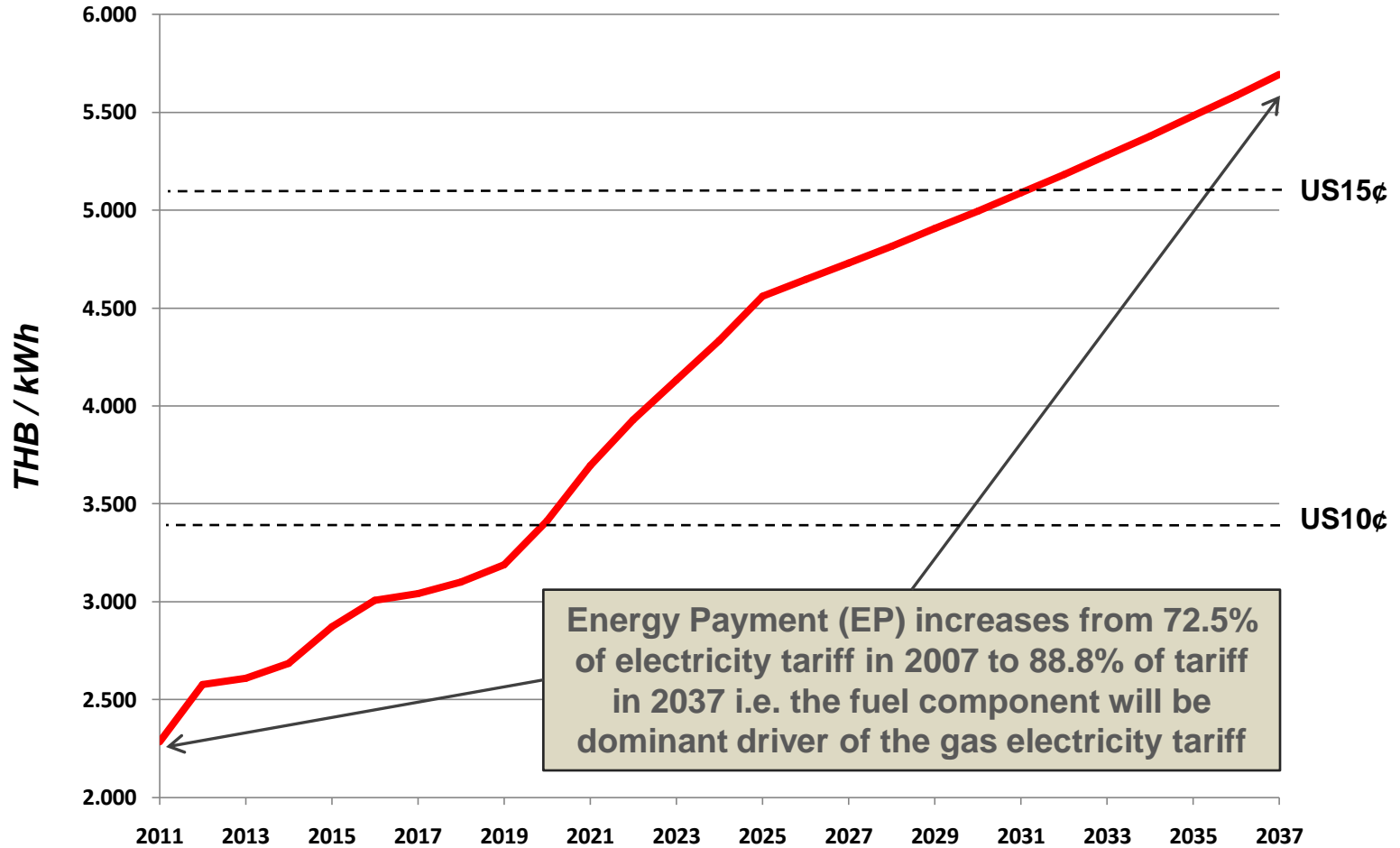
# Projected Thai Gas Price



Source: Hypothesis based on Wood Mackenzie gas price projections



# Gas SPP Power Price (Proxy)



Source: Hypothesis Gas SPP power tariff based on Wood Mackenzie gas price projections, without SPP gas price adjustment (THB34=US\$1)

# Going Forward: PDP 2007

---

## Relies on:

- ⇒ 5 x 700 MW coal plants 2013–2018
- ⇒ 4 x 1,000 MW nuclear plants 2020–2021
- ⇒ C. 3,000 MW from as yet unidentified import projects (hydro?)<sup>†</sup> post 2015

## Fails to meet government policy targets for renewable energy - peaks at 3.8% of installed capacity

- ⇒ Thailand's own target of 6% of energy generation by 2011;
- ⇒ ASEAN aspirational target of 10% of power generation by 2010

---

<sup>†</sup> Over and above Nam Theun 2, Nam Ngum 2, Theun Hinboun expansion, Nam Ngum 3, Nam Theun 1 and Nam Ngiep (Aggregate of 2,364 MW)

# Challenges, Opportunities and Future Directions

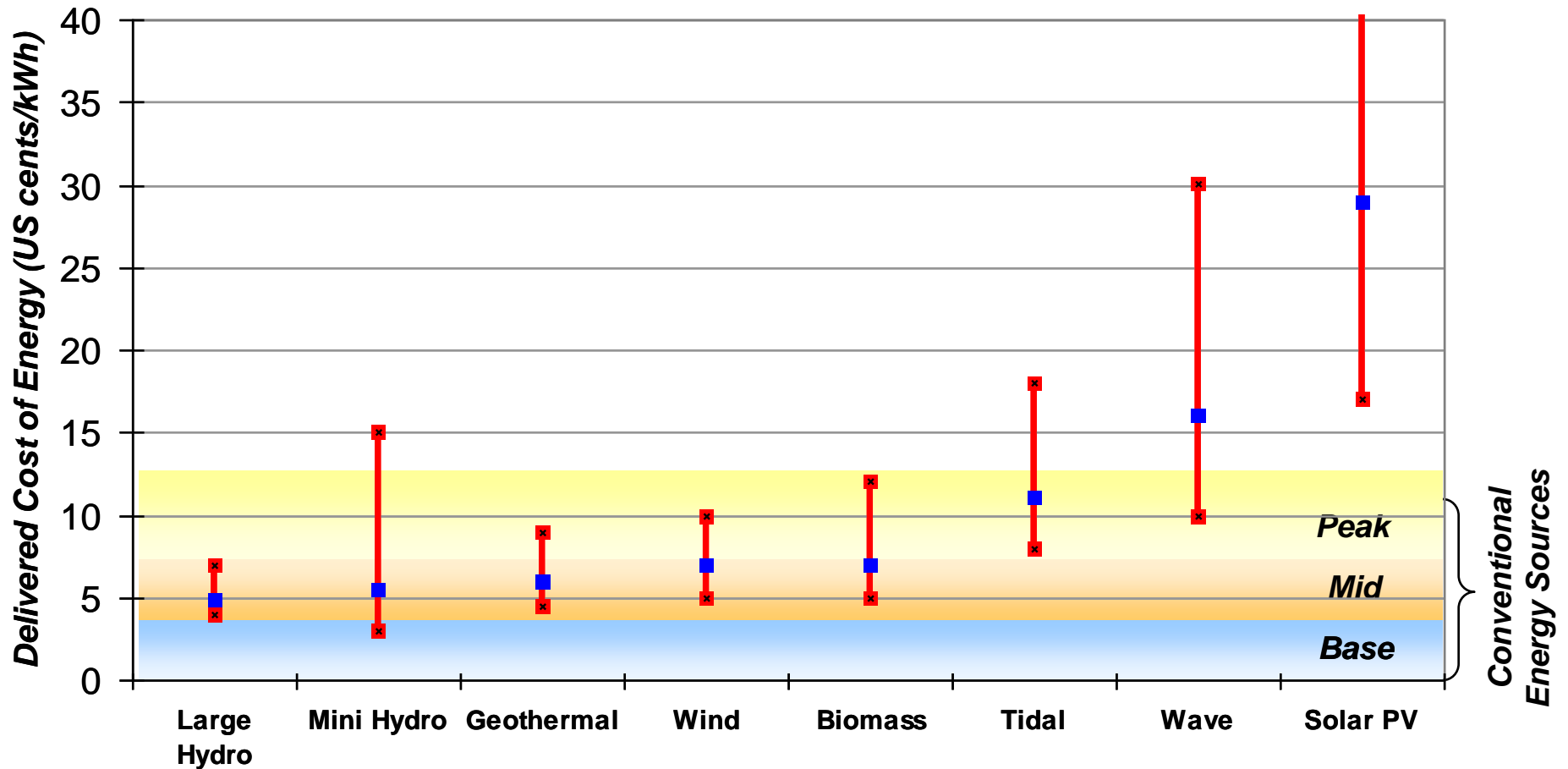
# But there are Shortcomings

---

- ❖ PDP 2007 fails to achieve meaningful energy diversification
- ❖ Based on current PDP options, energy will get more expensive and increasingly tied to US\$-linked fossil fuel pricing
- ❖ This will be exacerbated by rising (non energy) commodity prices fueled by resource hungry China and India
  - ⇒ Leading to rising costs for construction inputs
- ❖ PDP 2007 virtually ignores renewable energy at a time when this is gaining ground both globally and regionally
  - ⇒ As an antidote to energy security concerns;
  - ⇒ While meeting environmental and sustainable development imperatives; and...

# Renewables Start to Look Attractive

Representative Energy Costs for Various RE Technologies



Source: Aequero, industry sources. Indicative US market delivered energy costs assuming no tax credits and typical construction costs over period 2005-2007

# PDP 2007: Challenges Emerge

---

- ⚠ **Coal is presently the cheapest source of energy; but...**
    - ⇒ The perception is that it is dirty - gives rise to environmental issues, including GHG emissions
    - ⇒ Strong public resistance
    - ⇒ No realistic strategy for obtaining public acceptance
  - ⚠ **PDP 2007 could not have predicted oil would be close to US\$100 / bbl now with strong drag on gas prices**
    - ⇒ But there was no alternative presented
    - ⇒ 32 x 700 MW gas plants – seemed like a good idea...!
  - ⚠ **Nuclear energy in Thailand during PDP 2007 is a pipedream**
    - ⇒ Consider public reaction to coal
    - ⇒ There remain unsolved issues on fuel disposal
    - ⇒ Monumental planning and preparation required (expensive)
-

# PDP 2007: What if...?

---

## ❗ Thailand fails to implement 2 / 5 coal plants and nuclear?

- ⇒ Potentially require to increase gas generation by 5,400 MW (i.e. C. 8 x 700 MW plants)
- ⇒ Increase reliance on gas - close to 60% installed capacity; 80-85% of generation
- ⇒ Likely require an expansion of LNG import capacity

# Energy Security and Diversification

---

- ❗ **Over-reliance on energy (gas) supply from Myanmar is a significant concern**
  - ⇒ It would be a mistake to exacerbate this with additional energy imports (gas / hydro)
- ❗ **Careful consideration needs to be given to LNG sourcing**
  - ⇒ 50% of gas for power generation sourced from e.g. Myanmar and Iran would be regarded as a high risk strategy
- ❗ **Power generation imports from Laos, Cambodia and Malaysia would be preferred**
  - ⇒ Including potential for hydro, (clean) coal and renewable

# Possible Directions / Opportunities

---

- ⚠ **Potential for significant increase in renewable energy participation**
    - ⇒ Regional neighbours have targets of 20% renewable participation by 2020
    - ⇒ Thailand should match this, with an interim step of 10% by e.g. 2012
    - ⇒ Present policies and incentives do not go far enough
  - ⚠ **Careful strategy required to develop coal in Thailand**
    - ⇒ Clean coal can be a contributor to the energy mix if managed correctly
  - ⚠ **Don't export environmental problems**
  - ⚠ **Forget nuclear**
-

# Contacts

---



## Aequero

Energy and Infrastructure Finance Advisors

**Duncan Ritchie**  
Executive Director

Level 25, Bank of China Tower  
No. 1 Garden Road  
Central Hong Kong SAR

Tel: +852 8175 0221

Fax: +852 2251 1618

Mob: +852 9307 5343

Email: [duncan-ritchie@aequero.com](mailto:duncan-ritchie@aequero.com)

Web: [www.aequero.com](http://www.aequero.com)

**J. Grant Hauber**  
Executive Director

14 Robinson Road  
#13-00 Far East Finance Building  
Singapore 048545

Tel: +65 6722 8397

Fax: +65 6725 8038

Mob: +65 9005 7800

Email: [grant-hauber@aequero.com](mailto:grant-hauber@aequero.com)

---