Thailand’s Renewable Energy Policy: FiTs and Opportunities for International Support

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February 21-23, 2012
WRI-ADB Workshop on Feed-in Tariffs
Manila, Phillipines
1. Introduction
2. The State of Play of Renewable Energy in Thailand
4. Summary and Conclusions
1. Introduction
Thailand: an average increase of 3.2% per year over the past 10 years.
Thailand’s Fuel Mix for Power Generation (2010)

Total Installed Capacity: 31,517 MW
Thailand’s Electricity Industry Structure: The Enhanced Single Buyer Model

**Remarks:** % Share of Energy as of Dec 2009
2. The State of Play of Renewable Energy in Thailand
2.1 Planning and Strategy

Five Separate Energy Plans

- Power Development Plan 2010-2030 (PDP)
- 20-Year Energy Efficiency Development Plan 2011-2030 (EEDP)
- 5-Year Natural Gas Supply Plan
- NGV Roadmap
Some observations about the plans

- Prepared by different government divisions
- Not unified into a comprehensive plan
- Prioritizing different policy goals
  - Security of supply
  - Diversification
  - Returns on Investment of Capital (ROIC)
  - Climate Change
  - Economics
- Conflicting targets
  (esp. the PDP vs. the REDP; PDP vs. EEDP)
- Limited public participation
- Resource options identified but not evaluated
### The Need to Unify Renewable Energy Targets:

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Solar</td>
<td>500</td>
<td>2,000</td>
<td>923</td>
</tr>
<tr>
<td>Wind</td>
<td>800</td>
<td>1,200</td>
<td>798</td>
</tr>
<tr>
<td>Hydro</td>
<td>324</td>
<td>1,608</td>
<td>263</td>
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<tr>
<td>Biomass</td>
<td>3,700</td>
<td>3,630</td>
<td>2,340</td>
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<tr>
<td>Biogas</td>
<td>120</td>
<td>600</td>
<td>121</td>
</tr>
<tr>
<td>MSW</td>
<td>160</td>
<td>160</td>
<td>173</td>
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<tr>
<td>Other (hydrogen, tidal, geothermal)</td>
<td>3.5</td>
<td>3</td>
<td>0</td>
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<tr>
<td><strong>Total</strong></td>
<td>5,608 (by 2022)</td>
<td>9,201 (by 2021)</td>
<td>4,617 (by 2030)</td>
</tr>
<tr>
<td><strong>% of installed capacity</strong></td>
<td>11% of installed capacity in 2022</td>
<td>19.3% of installed capacity in 2021</td>
<td>6% of installed capacity in 2021</td>
</tr>
</tbody>
</table>
2.2 Generation-based Incentives

Feed-In Tariffs (ADDER) Program

- Support duration: 7 yrs from COD (10 yrs for solar and wind projects).
- Adder rates vary, depending on the technology used.
- Consumers pay in the form of Ft.

Base tariff regulation + automatic tariff adjustment mechanism (Ft)
<table>
<thead>
<tr>
<th>Type of RE</th>
<th>2007 Adder Rate</th>
<th>2009 Adder Rate</th>
<th>2010 Addder Rate</th>
<th>Special Adder for Diesel Replacement</th>
<th>Special Adder for Three Southernmost Provinces</th>
<th>Years Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biomass</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Installed Capacity ≤ 1 MW</td>
<td>0.010</td>
<td>0.017</td>
<td>0.017</td>
<td>0.033</td>
<td>0.033</td>
<td>7</td>
</tr>
<tr>
<td>Installed Capacity &gt; 1 MW</td>
<td>0.010</td>
<td>0.010</td>
<td>0.010</td>
<td>0.033</td>
<td>0.033</td>
<td>7</td>
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<tr>
<td><strong>Biogas</strong></td>
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<td>0.033</td>
<td>0.033</td>
<td>7</td>
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<tr>
<td><strong>Waste</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Landfill and Digestor</td>
<td>0.083</td>
<td>0.083</td>
<td>0.083</td>
<td>0.033</td>
<td>0.033</td>
<td>7</td>
</tr>
<tr>
<td>Thermal Process</td>
<td>0.083</td>
<td>0.117</td>
<td>0.117</td>
<td>0.033</td>
<td>0.033</td>
<td>7</td>
</tr>
<tr>
<td><strong>Wind</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installed Capacity ≤ 50 kW</td>
<td>0.117</td>
<td>0.150</td>
<td>0.150</td>
<td>0.050</td>
<td>0.050</td>
<td>10</td>
</tr>
<tr>
<td>Installed Capacity &gt; 50 kW</td>
<td>0.117</td>
<td>0.117</td>
<td>0.117</td>
<td>0.050</td>
<td>0.050</td>
<td>10</td>
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<tr>
<td><strong>Small/Micro Hydro</strong></td>
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<td></td>
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</tr>
<tr>
<td>50 kW &lt; Installed Capacity &lt; 200 kW</td>
<td>0.013</td>
<td>0.027</td>
<td>0.027</td>
<td>0.033</td>
<td>0.033</td>
<td>7</td>
</tr>
<tr>
<td>Installed Capacity ≤ 50 kW</td>
<td>0.027</td>
<td>0.050</td>
<td>0.050</td>
<td>0.033</td>
<td>0.033</td>
<td>7</td>
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<tr>
<td><strong>Solar</strong></td>
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<tr>
<td></td>
<td>0.267</td>
<td>0.267</td>
<td>0.217</td>
<td>0.050</td>
<td>0.050</td>
<td>10</td>
</tr>
</tbody>
</table>
Features of Thailand’s ADDER Program
(First phase: 2007-2010)

- **Eligibility**: non-utility power producers, (using solar, wind, biomass, biogas, hydro, MSW):
  - ≤ 10 MW: **VSPP Program** (connected to the distribution grid of PEA or MEA)
  - 10-90 MW: **SPP Program** (connected to the transmission grid of EGAT)
- **Cap**: None; but continued support subject to corresponding impacts on electric rate (Ft)
- **Designed by**: Ministry of Energy
- **Administered by**: utilities (EGAT, MEA, PEA) and ERC
- **Approval criteria**: distribution or transmission availability
- **Structure of the Program**:
  1) Must-take dispatch for connected projects
  2) Contract length: 7-10 years
  3) Bonus payment on top of regular electricity rates
  4) Simplified, streamlined pre-approval process through VSPP regulations
  5) No post-approval process for VSPPs
- **Years Supported**: 7-10 years from COD
- **Funding mechanism**: pass-through to ratepayers through Ft mechanism
How Adder Rates were Determined

CORY ET AL. (2009):

- Value of renewable energy generation
  - to society (e.g., internalizing externalities)
  - to utility (avoided cost)
- Levelized cost of electricity generation + reasonable IRR
- the result of an auction or bidding process
- A fixed price incentives unrelated to the actual levelized cost of electricity generation or the value of renewable energy generation

THAILAND HAS UTILIZED A COMBINATION OF THESE METHODS as INPUTS INTO POLICYMAKING
Key Features of Thailand’s ADDER Program

- Attractive rates based on the cost of energy production and reasonable returns on investment
- Guaranteed payment period (10 years for solar & wind, 7 years for other RE)
- Long-term must-take contracts
- Streamlined application procedures (in the first phase only)
- Uniform interconnection standards.
On-grid RE Capacity: Before and After Adder

- **Biogas**
  - Dec 2006: 5.87 MW
  - Dec 2007: 6.77 MW
  - Dec 2008: 12.52 MW
  - Dec 2009: 43.04 MW
  - Dec 2010: 61.33 MW
  - Sep 2011: 106.94 MW

- **Biomass**
  - Dec 2006: 454.53 MW
  - Dec 2007: 508.14 MW
  - Dec 2008: 564.75 MW
  - Dec 2009: 637.14 MW
  - Dec 2010: 666.07 MW
  - Sep 2011: 704.72 MW

- **Solar**
  - Dec 2006: 0.01 MW
  - Dec 2007: 1.41 MW
  - Dec 2008: 17.56 MW
  - Dec 2009: 7.63 MW
  - Dec 2010: 26.29 MW
  - Sep 2011: 65.15 MW

- **Waste**
  - Dec 2006: 1.00 MW
  - Dec 2007: 1.60 MW
  - Dec 2008: 2.60 MW
  - Dec 2009: 10.82 MW
  - Dec 2010: 29.82 MW
  - Sep 2011: 37.33 MW

- **Small-Micro Hydro**
  - Dec 2006: 0.00 MW
  - Dec 2007: 0.06 MW
  - Dec 2008: 0.06 MW
  - Dec 2009: 0.54 MW
  - Dec 2010: 0.86 MW
  - Sep 2011: 14.00 MW

- **Wind**
  - Dec 2006: 0.00 MW
  - Dec 2007: 0.00 MW
  - Dec 2008: 0.08 MW
  - Dec 2009: 0.38 MW
  - Dec 2010: 0.38 MW
  - Sep 2011: 0.38 MW
Criticisms

POLICY:

(1) A lack of unified policy packages: Impressive results from the Adder program is not used as an input into long-term power supply procurement plan.

(2) Rapid changes to the policy: The adjustment of the solar adder rate came without public warning.

IMPLEMENTATION:

(1) Transparency: in the queuing and approval process

(2) Regulatory barriers: increasing uncertainties for investors after regulatory changes in 2010; redtape and bottlenecks
The Evolution of Thailand’s ADDER Program (1)

1992-2009: laying the foundation for the ADDER program

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>- Regulations for Power Purchase from SPPs (10-90 MW) approved → EGAT was allowed to purchase power from SPPs using non-conventional energy (RE &amp; Cogeneration) as fuel.</td>
</tr>
<tr>
<td>2002</td>
<td>- VSPP Regulations drafted, based on net-metering regulation in the U.S., approved by Cabinet, applicable to generation sized &lt;1MW. - Applicable to renewable and co-generation facilities - Up to 1 MW contracted capacity - Tariffs set at avoided cost (wholesale or retail tariff + Ft)</td>
</tr>
<tr>
<td>2006</td>
<td>- Contracted capacity of VSPP extended from 1 MW to 10 MW - Feed-inTariffs (“ADDER”) program approved by Cabinet</td>
</tr>
<tr>
<td>2007</td>
<td>- ADDER program implemented by utilities - ADDER rate bidding for biomass SPPs, 7 biomass projects chosen - ADDER rates for wind power projects increased and support period for wind &amp; solar projects extended from 7 to 10 years - ADDER rates for three Southernmost provinces introduced</td>
</tr>
<tr>
<td>2009</td>
<td>- ADDER rates adjusted to encourage smaller-scale installations and diesel offsets - Some rules and regulations adjusted (bid bond, dispatch, and rooftop solar)</td>
</tr>
</tbody>
</table>
The Evolution of Thailand’s ADDER Program (2)

2010-2011: ADDER Program Reviewed and Revised

- Solar application acceptance temporarily closed
- Policy to focus solar FiTs on rooftop systems only
- Post-approval regulations become more stringent for all technologies
- Rate structure to be changed from adder to fixed feed-in-tariff
- “Managing Committee” established to coordinate, regulate the program and approve projects

2011

- The study of fixed feed-in tariffs for all technologies in process
2.3 Regulatory Changes: Evolution of the Adder Program

- **Simplified, Streamlined VSPP Regulation**
  - Application **deadline** at end of 2008 caused a “solar gold rush”

- **March 2009**
  - Bid bond introduced
  - Solar applications no longer accepted

- **April 2010**
  - *Solar Adder Rate reduction* from 8 to 6.50 Baht/kWh
  - *Managing Committee established*

- **June 2010**
  - Ad hoc rules changes

- **More complex regulation/regulatory process**

- **ADDER for other REs continue, but will be adjusted to fixed-price FiTs, not variable to changes in electricity rates**
Factors that have triggered the review:

1. Changing market conditions
2. Impacts on ratepayers
3. Implementation problems
   - applied vs. actual megawatts
(1) Changing Market Conditions: PV Price Trend

Source: Paula Mints, Navigant Consulting (2011)
(2) Rising electricity rates & impacts on ratepayers

While the base tariff has been constant since 2005, the fuel adjustment component (Ft) of the tariff has seen an upward trend since 2008.
Rush of applications at the end of 2008

In two and a half years, 1,620 MW worth of contracts have been signed, but only 6.77 MW have materialized (connected and selling to the grid).

The rest of the projects are still under development (seeking loans, investors, etc.)

Measures to discourage speculators passed starting March 2009, implemented October 2009.
June 2010: Cabinet’s Resolutions

- A halt to solar application acceptance
- A reduction in solar adder from 8 Baht/kWh to 6.50 Baht/kWh (about 22 cents/kWh) for projects that had not signed PPAs
- A change in pricing structure from ADDER to Fixed-Price Feed-In Tariff (the total price per kWh is independent of base tariff and Ft)
- A change in pass-through mechanism from Ft to base tariff
- A formation of a new committee that will oversee the regulation of RE projects in the pipeline.
Comprehensive Measures to Address Speculation Problem: 2009-2011

**APPLYING**
- a bid bond requirement of 200 Baht/kW (~3USD/kW) for project sized >100 kW
- applicable retroactively to projects without PPAs before August 2009

**UNDER CONSIDERATION**
- Utilities’ acceptance criteria no longer based solely on technical availability of the grid
- **Additional criteria:** projects’ readiness in four aspects – land, loan, technology, and permits from other agencies

**ACCEPTED**
(to sign PPAs)
- more stringent enforcement – failure to sign PPAs within the specified time period results in the termination of the application process

**PPA SIGNED**
- to submit progress reports within the 6 months before the SCODs
- After the PPA has been signed, any SCOD postponement request will be assessed based on the 4 aspects of project’s readiness; extension is allowed up to 6 months.

**SCOD**
- a 6-month grace period for projects that cannot meet the SCOD deadline and are still in contact with the utilities
- Contract termination for projects that are not in contact with the utilities

NEW RULES INTRODUCED IN A PIECEMEAL AND NON-TRANSPARENT MANNER, CAUSING CONFUSION AND LOSSES OF INVESTORS’ CONFIDENCE
## Some questions on transparency

| -queuing and approval process | -Who gets ahead in the line?  
|                             | Any preferential treatment?  
|                             | -What is the timeframe for project approval and PPA signing? |
| -approval criteria          | -What criteria are used for project approval and PPA signing?  
|                             | -Are these criteria announced to the public? |
| -applicability of the reduced adder | -Which projects should the reduced adder be applied?  
|                              | -What about the projects without PPAs that already got in the line? |
| -acceptable level of pass-through costs | -What is the official ceiling of the pass-through costs to ratepayers (\$/kWh) |

- high uncertainty  
- high transaction cost  
- low transparency  

- Process susceptible to bribery and graft
Policy Revision: from ADDER to Fixed-Price Feed-In Tariff

June 2010: approved by the Cabinet:

**Premium-price FiT:**
- *Total tariff rate varies with Ft+base tariff*
- *increases over time*

**Fixed-price FiT:**
- *Tariff rate independent of market price*
- *Constant over a fixed period of time*

As of Nov. 30, 2011

Not yet proposed to the gov.
## Overall Assessment of the Adder Program: Strengths and Weaknesses

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>-simple FiT rate structures</td>
<td>-Not backed up by the law</td>
</tr>
<tr>
<td>-attractive FiT rates that induce investment</td>
<td>-Weak regulatory support</td>
</tr>
<tr>
<td>-secured contracts to purchase electricity for 5 years with automatic renewal</td>
<td>-lack of program cap in combination with deadline for application filing</td>
</tr>
<tr>
<td>-special rates for diesel substitution and for areas with political unrest</td>
<td>-lack of public discourse on acceptable pass-through costs to ratepayers</td>
</tr>
<tr>
<td>-other supporting measures quite attractive, esp. for large-scale projects</td>
<td>-Increasing redtape and bottlenecks in application processing…raising questions of transparency</td>
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<tr>
<td></td>
<td>-Lack of consumers’ interest</td>
</tr>
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</table>
### Existing RE Policies: International Comparison

<table>
<thead>
<tr>
<th>Country</th>
<th>Feed-in tariff</th>
<th>RPS</th>
<th>Capital subsidies, Grant, rebates</th>
<th>Tradable RE certificates</th>
<th>Net Metering</th>
<th>Public investment or Loan</th>
<th>Competitive Bidding</th>
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<tbody>
<tr>
<td>Denmark</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>Germany</td>
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<tr>
<td>Japan</td>
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<td>✓</td>
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</tr>
<tr>
<td>Malaysia</td>
<td>(to be launched in 2011)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Indonesia</td>
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<td>China</td>
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<tr>
<td>Thailand</td>
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<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ (SPP)</td>
</tr>
</tbody>
</table>

Financial Mechanisms for RE Support

- Low-Interest Loan: Revolving Fund
- Venture Capital: ESCO Fund
- Tax Incentives: BOI privilege
- Feed-in tariff: ADDER
Revolving Fund

- Provided via financial institutions for investment in:
  - Energy efficiency improvement projects
  - Renewable energy development and utilization projects

11 local financial institutions have participated.

Max. interest rate: 4%
Max. loan period: 7 years

January 2003 – present
7000 M Baht

- The ENCON Fund imposes 0.5% interest rate on financial institutions, starting from Phase 2 onwards.
- Results:
  - Reduce oil imports of over 400 million litres/yr.
  - Reduce power demand over 200 MW
ESCO Fund

A source of venture capital for ESCOs to jointly invest with private operators in energy efficiency & renewable energy projects. The program targets SMEs & small projects.

Energy Conservation Promotion Fund

ESCO Fund
Investment Committee

Investor
Investor
Investor

Fund Manager
ESCO Venture Capital  Equity Investment  Equipment Leasing
Carbon Market  Technical Assistance  Credit Guarantee Facility

Expected saving 300 ktoe
Thailand’s Board of Investment (BOI)’s tax incentives for renewable energy projects:

- Corporate income tax holidays up to 8 yrs. Additional 50% reductions of corporate income tax for 5 yrs
- Import duty reductions or exemptions on equipment and raw materials
- Double deduction of public utility costs
- Deductions for infrastructure construction/installation costs
1. RE Intermittency and Implications for Grid Planning and Operation

- Lack of body of knowledge that assesses RE’s impacts on the Thai grid and potential solutions
- Lack of platform to strategically optimize increasing grid-connected RE capacity

2. Building up technical human resources availability

- Human resource needs for equipment manufacturing, project design, commissioning, maintenance, decommissioning.
2.6 Summary of the State of Play

Lack of Strategic Integration of policies and measures
FiT could be framed as the central part of a long term strategy to meet energy policy goals.

Need for stronger and more transparent regulatory support
Transparent and forward-looking regulation is needed for successful FiT implementation.

Financing Options
Available but may not reached small investors yet.

Supportive technical environment
Eventual technical limits in the absence of utility-level planning to accommodate increasing RE grid penetration.
Most Important Barriers

- **Planning barriers** may result in interruptions in RE support.

- **Weak regulations and lack of transparency** create an atmosphere of uncertainties for investors and unfair advantages for some investors.

- **Technical barriers** create an eventual limit to RE penetration.

- **Lack of a public discourse** on acceptable pass-through cost to electricity rates.

- **Supply-side orientation & absence of consumers’ demand** for clean energy and direct benefits to consumers.
POLICY PUSH

CONSUMERS PULL

governance monitoring & creating demand for clean energy and better governance

Citizen Journalism

Consumers’ Participation and Ownership

Technical Capacity Building

Equitable Financing

Regulation

Planning & Strategy

Enabling Environment

IRP (alternative PDP)

MOE/ERC/ADB

SMART GRID

Utilities/MOE/ADB

Governance Benchmarking

TRF/ADB

POLICY PUSH
International support as a form of leverage for improved governance – essential to continued success of program.
Conclusions and Further Recommendations

• Successful FiT programs require more than “getting the prices right.”

• Governance problems have to be sorted out first before RE can be rapidly scaled up

• In the long run, rapid expansion of RE is going to become a greater burden for poor consumers and hence some financial assistance will be needed for FiT program.