IMPORTANCE OF INTEGRATED ELECTRICITY PLANNING FOR THE MEKONG REGION

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Key arguments

- Energy markets & ecosystems greatly influenced by planning practices
  - *demand forecasting*
  - *options assessment*
  - *integration of environmental & social goals*
- The time has come for energy planners to adopt IRP practices
  - Integrated resource planning
  - Proven, international best practice
  - Do it, and public acceptance of new power plants will increase

Community mobilization around power plants & local rights, Thailand

Power Planning's Three Simple Questions

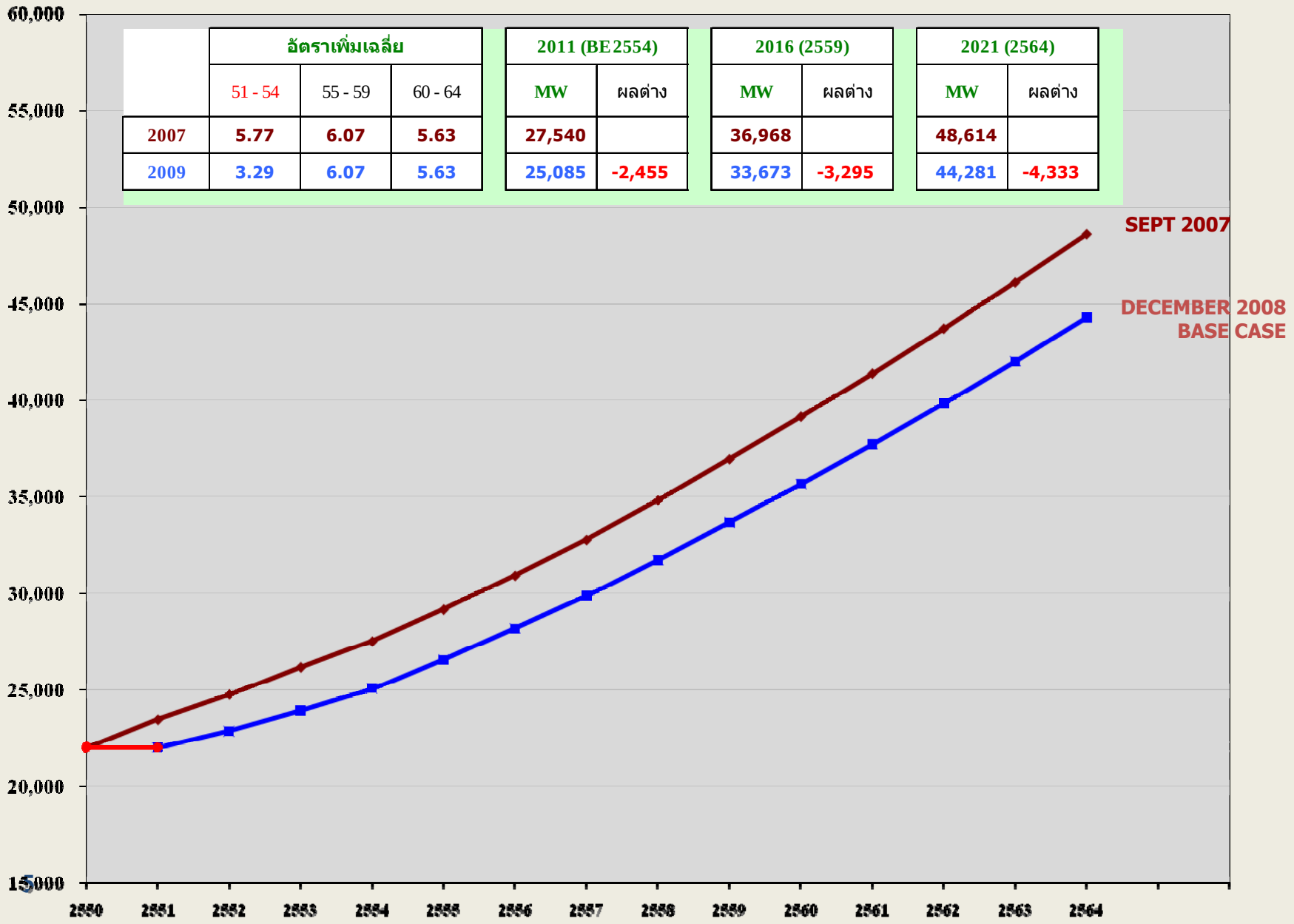
- *How Much Energy Will We Need?*
- *When Will We Need It?*
- *What Should We Build?*

Demand forecasting

When will we need electricity? How much?

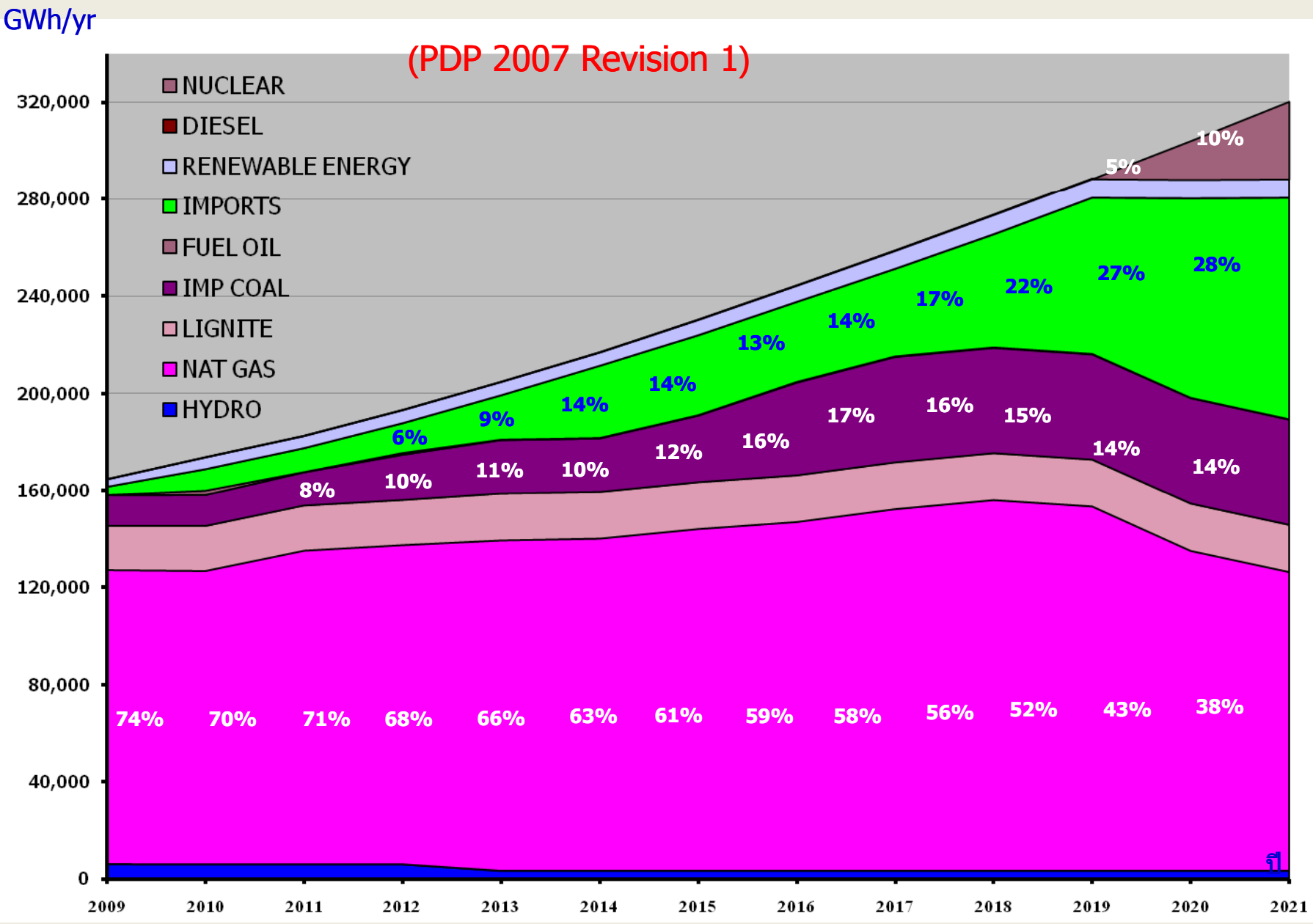
- High rates of forecasted power demand growth
  - Vietnam: 10% per annum (PDP VI)
  - Thailand: 5% per annum (PDP 2007 Rev2 base case)
  - GMS: >6% per annum (prior to financial crisis)
- Demand is high but also uncertain

Thailand power demand 2007 vs. 2008 forecasts

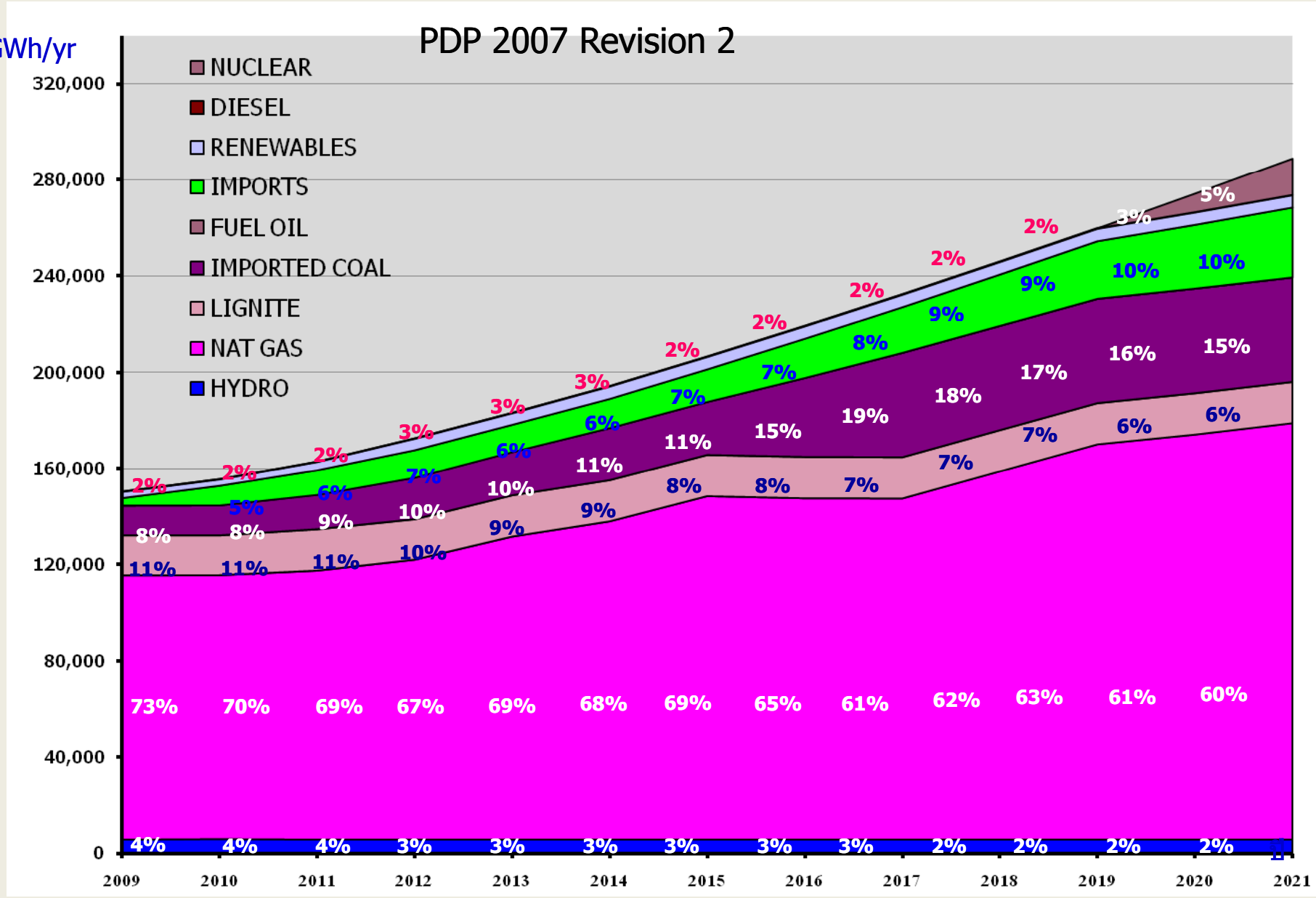


	อัตราเพิ่มเฉลี่ย			2011 (BE 2554)		2016 (2559)		2021 (2564)	
	51 - 54	55 - 59	60 - 64	MW	ผลต่าง	MW	ผลต่าง	MW	ผลต่าง
2007	5.77	6.07	5.63	27,540		36,968		48,614	
2009	3.29	6.07	5.63	25,085	-2,455	33,673	-3,295	44,281	-4,333

Thailand Electricity generation fuel mix – previous PDP



Thailand Electricity generation fuel mix –current PDP



Demand forecasting

- Are we doing best-practice demand forecasting?
- Top-down statistical models
  - *Demand = function(GDP, temperature, …)*
- But best practice = bottom-up sector-by-sector models
  - Demand is modeled by sector-by-sector variables + GDP forecasts

Options assessment

What should we build?

- Current objectives (Thailand):
  - Minimize financial costs
  - Maximize system reliability
  - Comply with environmental laws
  - Comply with national energy policy
  - Practical plan
  - Social acceptance

Do other objectives deserve emphasis?

Environmental & social goals for energy planners?

- *Minimize health impacts*
- *Minimize ecosystem damage*
  - *including climate change from CO2 emissions*
- *Manage financial risks from fuel price volatility*
- *Create quality jobs for rural sector*

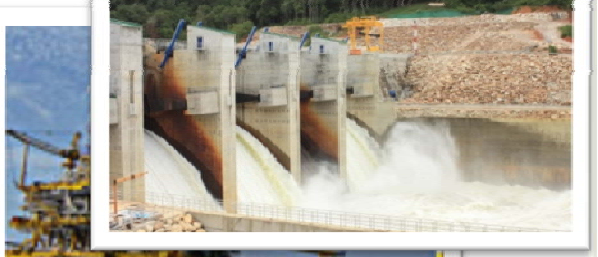
California (since 2005)

Priority for electricity services

1. ***Energy efficiency***
2. ***Renewable energy & distributed generation***
3. ***Clean & efficient fossil-fuel generation***

Options Assessment

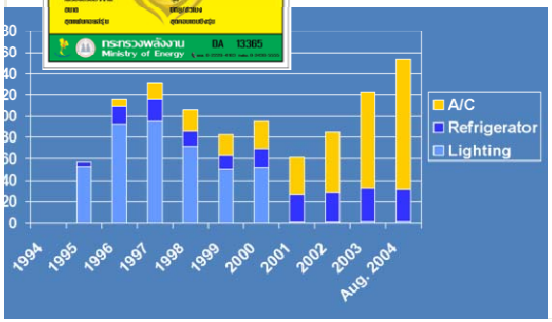
CAPITAL INTENSIVE (HARDWARE)



DEMAND -SIDE

SUPPLY-SIDE

KNOWLEDGE INTENSIVE ("SOFTWARE")



Options assessment

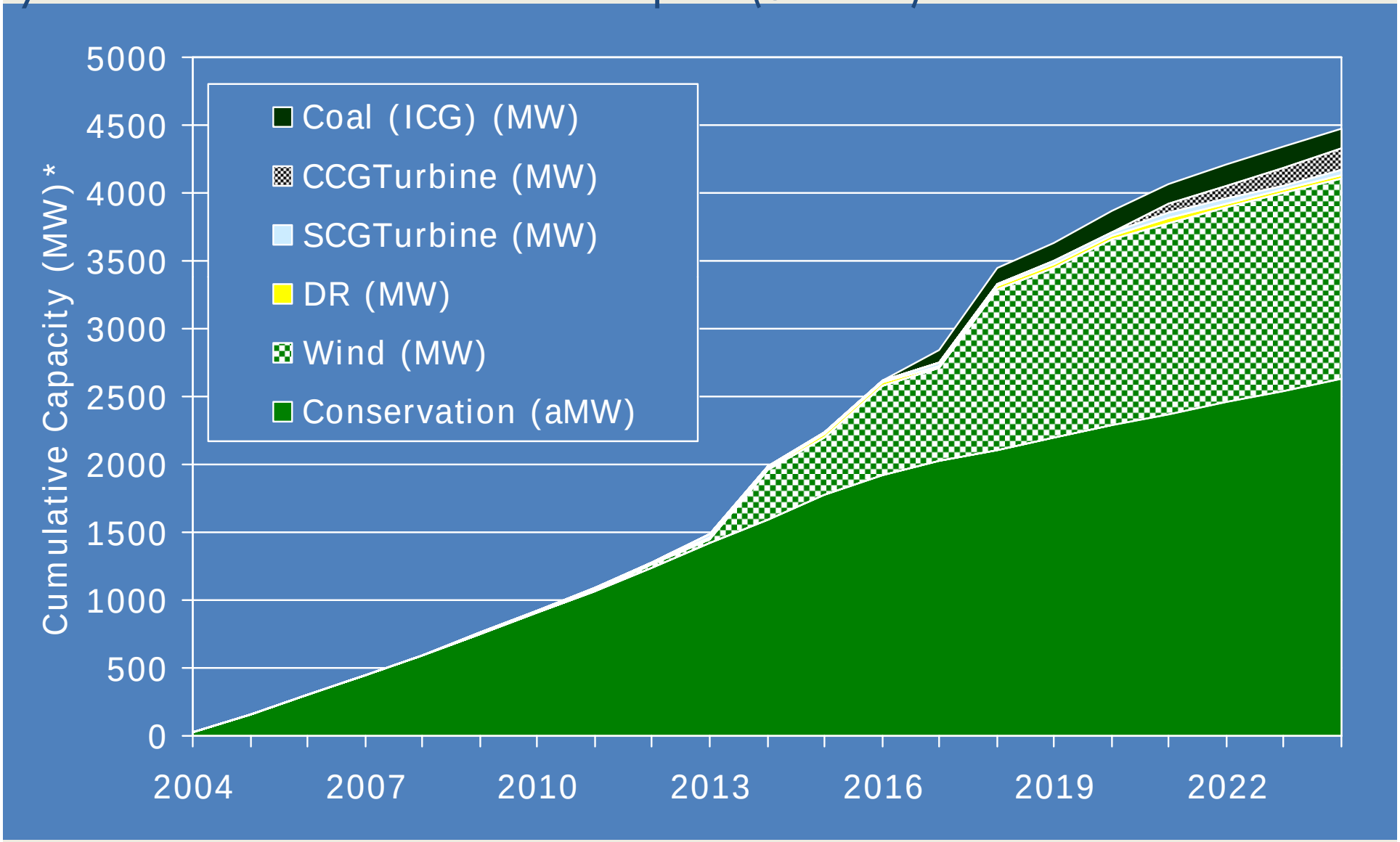
- Emphasis is on LARGE supply-side options
  - gas, coal, hydro, nuclear
- Assumption is that large scale → low per-unit cost

Options assessment: Energy Efficiency

Are we giving EE first priority?

- Energy efficiency (EE) is <50% of cost of new supply
- What can we do to increase EE?
  - Key appliance minimum standards & labeling
  - Building retrofits [e.g. EGAT light bulb substitution]
  - Insulation
  - Window overhangs
  - Use of fan + air conditioner, not AC only
- *. . . But EE options are not given equal status when compared to supply side options!*

Results from U.S. Northwest Power & Conservation Council 20-year load forecast and resource plan (5th Plan)



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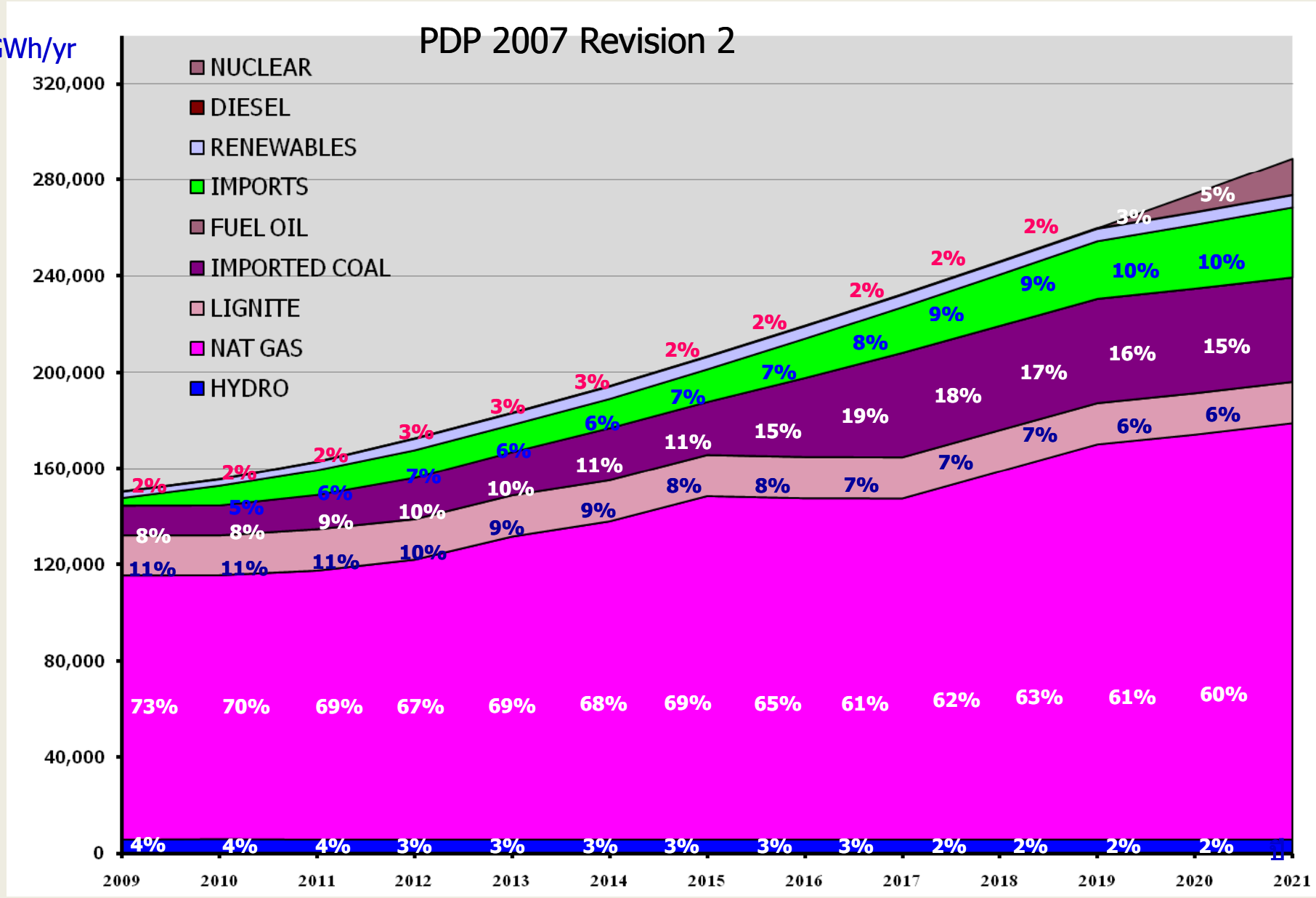
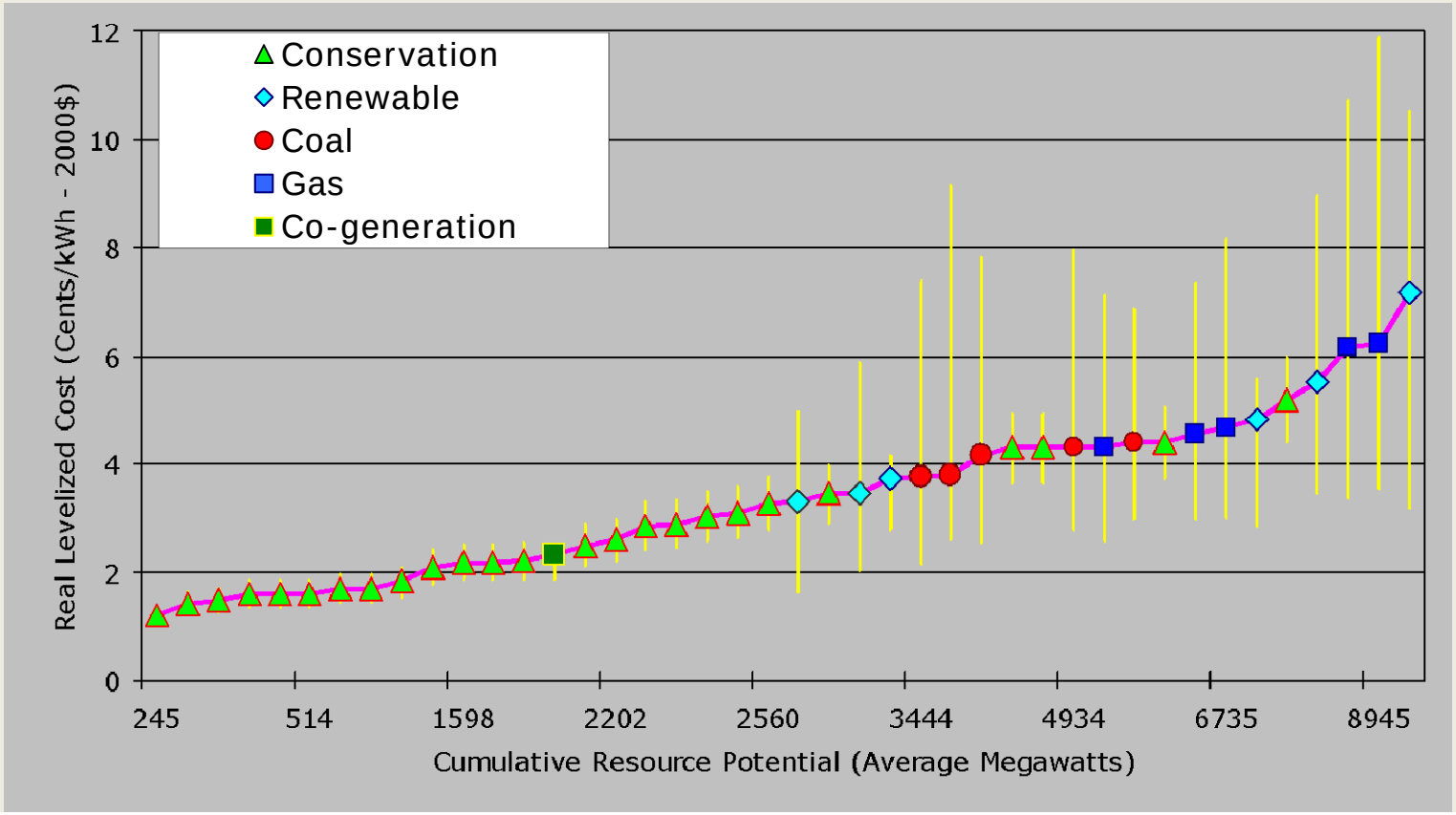


Isn't it time we integrated the planning?

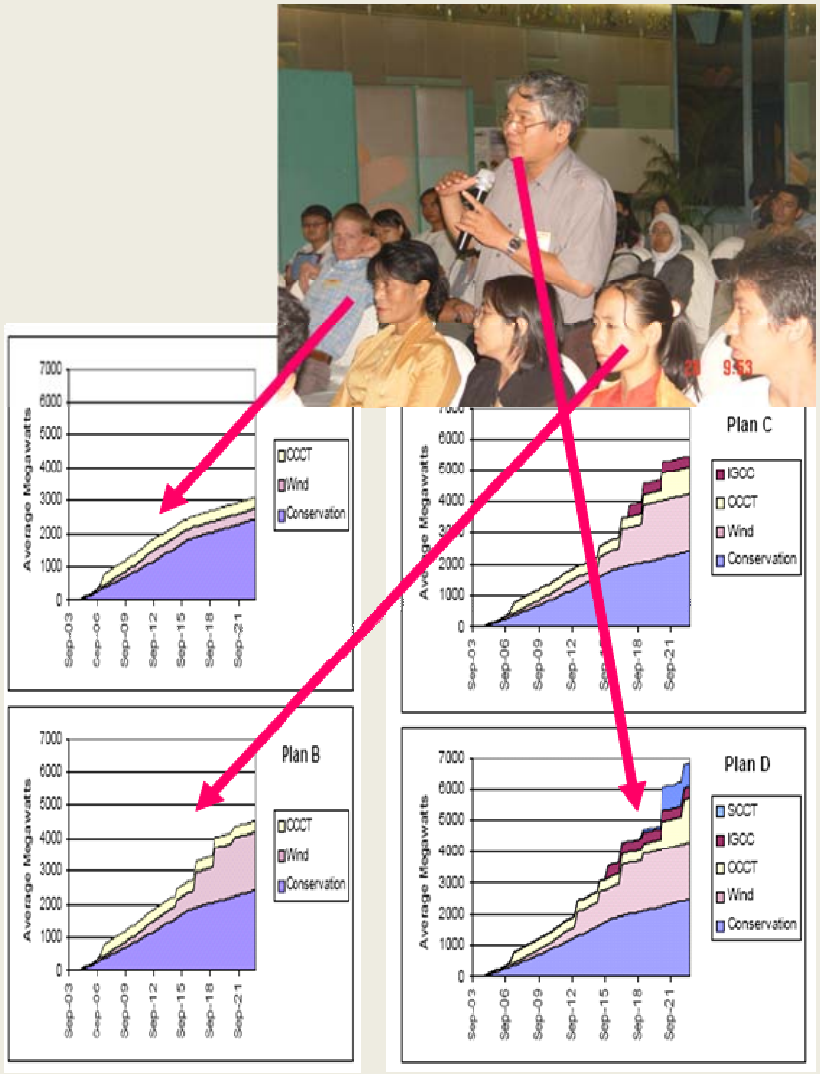
Thai officials + civil society study exchange to U.S.

Integrated Resource Planning
definition:

- Systematic evaluation of the least cost/least risk portfolio of resource choices where energy efficiency and demand side management are treated *equivalent* to generating resources



IRP can be designed as an integrated, participatory assessment



Demonstration of IRP

Work in progress (see Foran 2008 [in Thai])

- *How much electricity (kWh, MW) from large stations could be avoided if Thailand were to attain its 'practically achievable potentials' in*
  - *Energy efficiency*
  - *Renewable energy*
  - *Natural gas CHP (combined heat and power) ?*

- Timeframe: 2008-2018; 2008-2027 (for RE)
- "Practically achievable potential"
  - It is < Commercially viable potential < Economically viable potential < Technical potential
  - การประหยัดพลังงานไฟฟ้าที่คุ้มค่าทางการเงินและบรรลุได้ในทางการตลาด
  - . . . thus it is an estimate, requires dialogue

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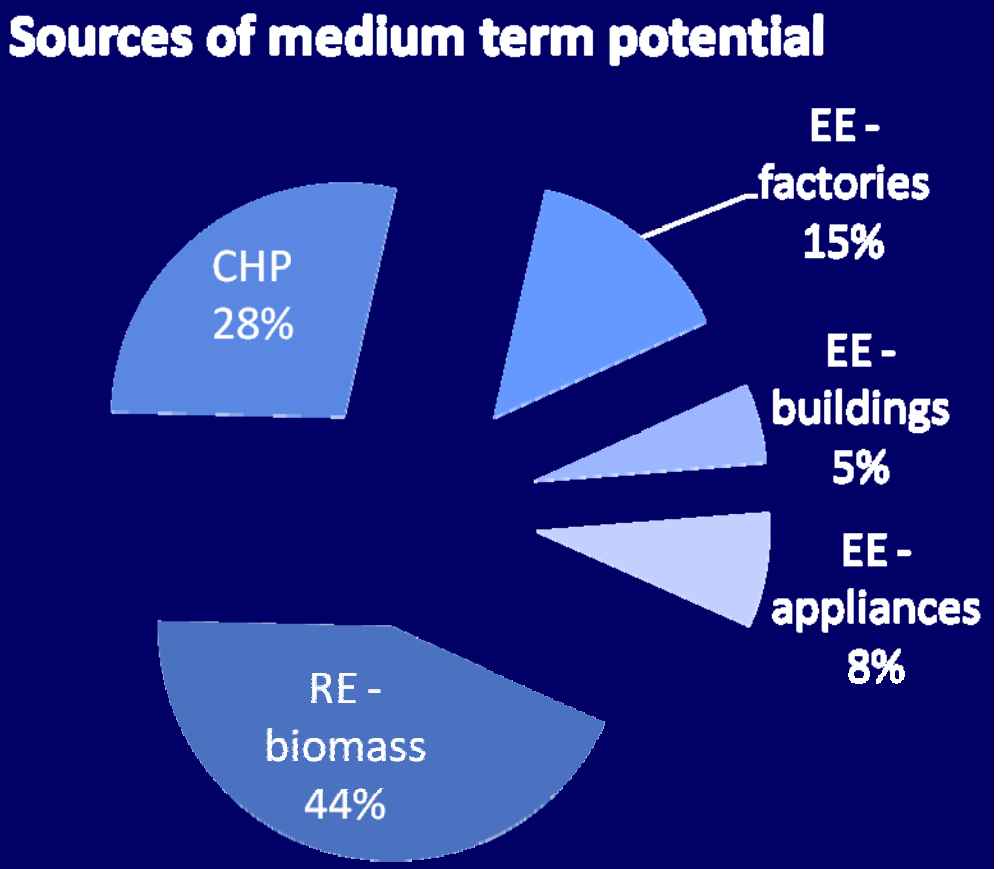
Clean, distributed, domestic options achievable by 2018 for Thailand (preliminary results)

- Total achievable by 2018:
  - 7913 MW (~ 33,000 GWh)
  - Based on detailed review + modeling
- *Near-term* potential:
  - 3023 MW (Programs for <100MW producers)
- *Medium-term* potential:
  - 4890 MW (our analysis)
  - Needs increased feed-in tariffs for RE
  - Needs enhanced support for EE



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If *all* clean domestic (7913 MW) substitutes for imports, Thailand might avoid:

- 2011 ~ Nam Ngum 2 (597 MW)
- 2012 ~ Theun Hinboun Expansion (220 MW)
- 2013 ~ Nam Ngum 3 (440 MW) + Hongsa 1 (490MW)
- 2014 ~
  - *Either:* Nam Theun 1 (523 MW), Nam Ngiap (261 MW), Nam Ou 1 (200 MW)
  - *Or:* Hongsa 2 & 3 (2 x 490 MW)
- 2015 ~ Nam Ou 2 (843 MW)
- 2017 ~ Unspecified (510MW)

(Purchase dates from PDP 2007 Revision 1)

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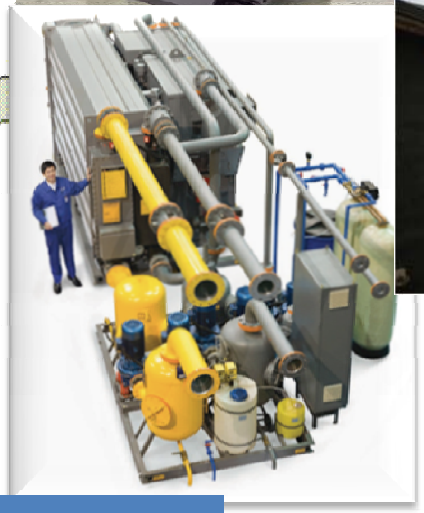
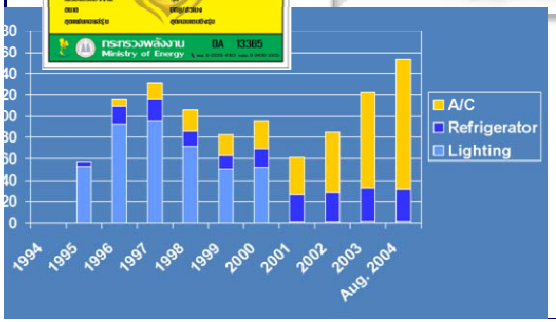
Isn’t it time to integrate the planning?

CAPITAL INTENSIVE (HARDWARE)

DEMAND -SIDE



SUPPLY-SIDE



KNOWLEDGE INTENSIVE (“SOFTWARE”)

Additional points about IRP & planning in Thailand

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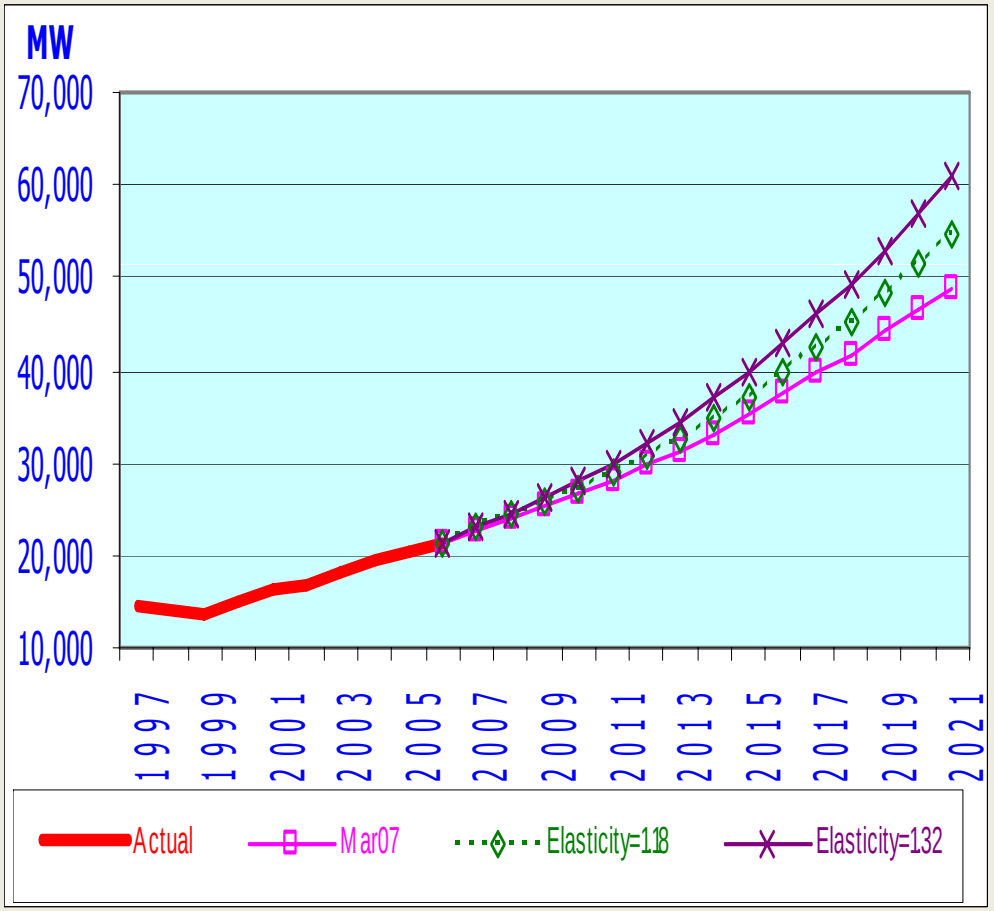
IRP: who typically does it & in what context?

- Requires engineering and economic data
- . . . utilities typically do it
- In North America: required to do so by strong regulators
- Hasn't always been popular
  - belief that privatization makes detailed planning unnecessary

Thai PDP still does not take energy efficiency seriously

- Energy efficiency is not modeled in a detailed manner
  - Assumption that "elasticity" of economy will improve
  - = Top-down approach
- EGAT's DSM division does a 5-year plan, but PDP is a 15-year plan



Thai PDP still does not consider renewable energy seriously

- Many Small Power Producers (10-100MW) are treated as "non-firm" power
  - Their MW supplied not included in the PDP
- All power from Very Small Power Producers (1-10MW) is treated as "non-firm"
  - Their MW supplied not included in the PDP
- Energy from "non-firm" plants is accounted for on the demand-side (external to cost optimization)
  - analyzed in a superficial manner in the Load Forecast

Options assessment – renewables

- **Thailand: Renewable options are given second priority**

Ministry of Energy target by 2022	**3,858 MW**

Power plant in EGAT PDP by 2021	MW	%
Renewable	**900**	**4%**
Non-renewable	21,753	96%
Total	22,653	100%

If we want to integrate environmental & social goals . . .

We need to increase:

- *Public disclosure & access*
- *Transparency*
- *Public participation*
- *Professional capacity*

- Overall, we find increasing of non-financial, non-engineering criteria
- Performance varies between countries

Conclusion: Isn't it time we integrated electricity planning?

- Electricity markets are profoundly shaped by planning practices
- Current practices focus too much on financial costs & engineering reliability
  - → Social tension in & between countries
- IRP (integrated resource planning) is proven best practice
- Preliminary IRP analysis for Thailand shows >7900 MW can be avoided from large power plants
  - Defer building / buying power from coal, gas, hydro & nuclear