The Renewable Energy Roadmap

National Energy Security 2012 Conference
CLOSING THE ENERGY SUPPLY – DEMAND GAP
28th Feb 2012

Renewable Energy Development in Malaysia

8TH Malaysia Plan (2001 - 2005)

- RE as the 5th Fuel
- Implied 5% RE in energy mix

9th Malaysia Plan (2006 – 2010)

- **Targeted RE capacity to be connected to power utility grid:**
  - 300 MW – Peninsular Malaysia; 50 MW - Sabah
- **Targeted power generation mix:**
  - 54.2% natural gas, 40.2% coal, 5.2% hydro, 0.2% oil,
  - 0.2% Renewable Energy
- Carbon intensity reduction target: 40% lower than 2005 levels by 2020

RE as of 31st December 2010

- Connected to the utility grid: **61.2 MW (17.5%** from 9th MP target)
- Off-grid**:** >1GW (private palm oil millers and solar hybrid)

Malaysian National RE Policy & Action Plan

Malaysian National Renewable Energy Policy and Action Plan

Approved by Cabinet on 2nd April 2010

Policy Statement:

Enhancing the utilisation of **indigenous renewable energy** resources to contribute towards national **electricity supply security** and sustainable socio-economic development.

Objectives:

- To increase RE contribution in the national power generation mix;
- To facilitate the growth of the RE industry;
- To ensure reasonable RE generation costs;
- To conserve the environment for future generation; and
- To enhance awareness on the role and importance of RE.

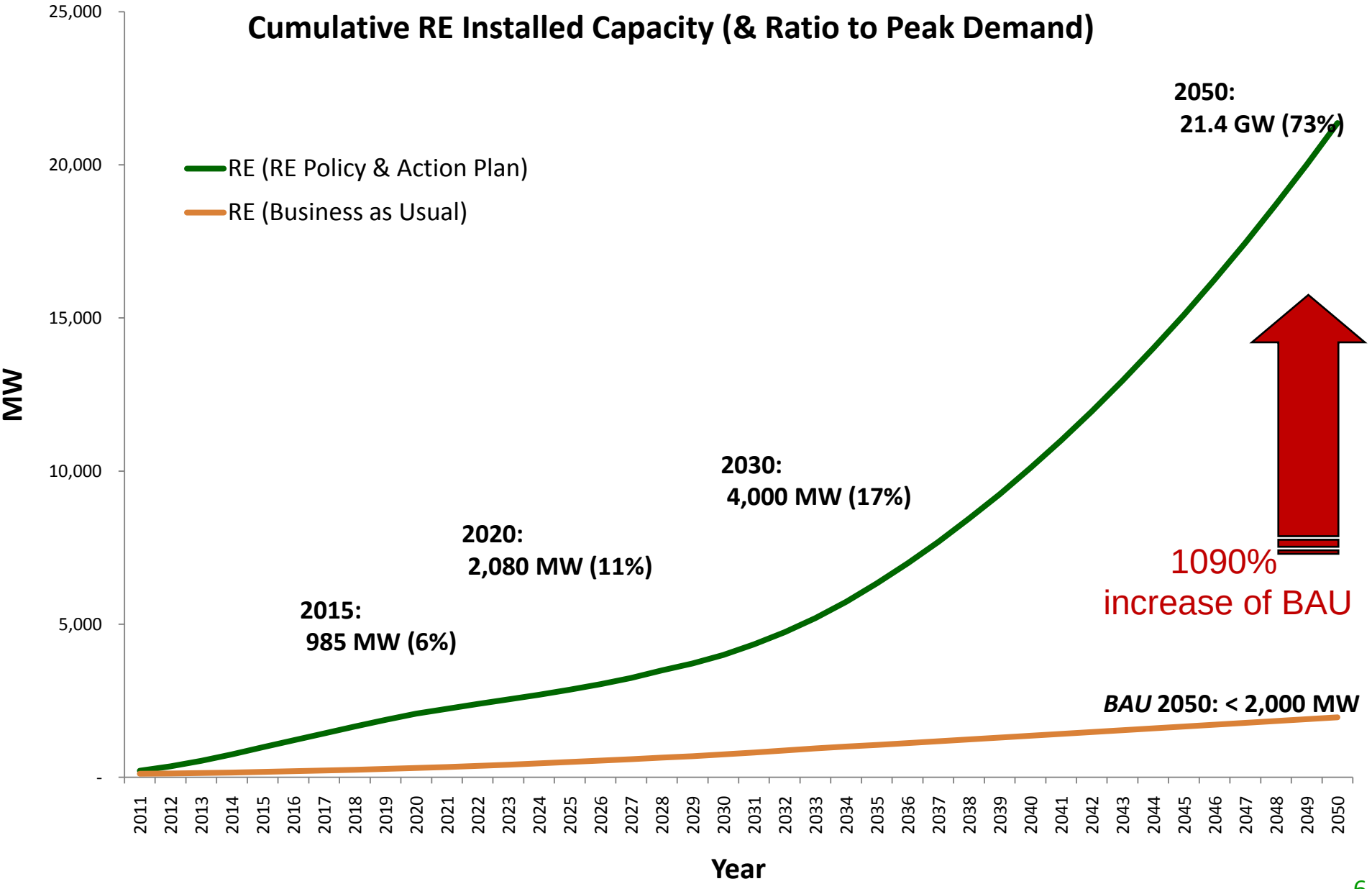
National RE Targets

Year	Cumulative RE Capacity	RE Power Mix (vs Peak Demand)	Cumulative CO2 avoided
2011	73 MW	0.5 %	0.3 mt
2015	985 MW	6%	11.1 mt
2020	2,080 MW	11%	42.2 mt
2030	4,000 MW	17%	145.1 mt

Actual RE installed capacity at 31 Dec 2011 was about 65 MW, most of it from biomass plants in Sabah

RE capacity achievements are dependent on the size of RE fund

RE Policy & Action Plan: Targets



EPP 10 – Solar Power Capacity Initiative

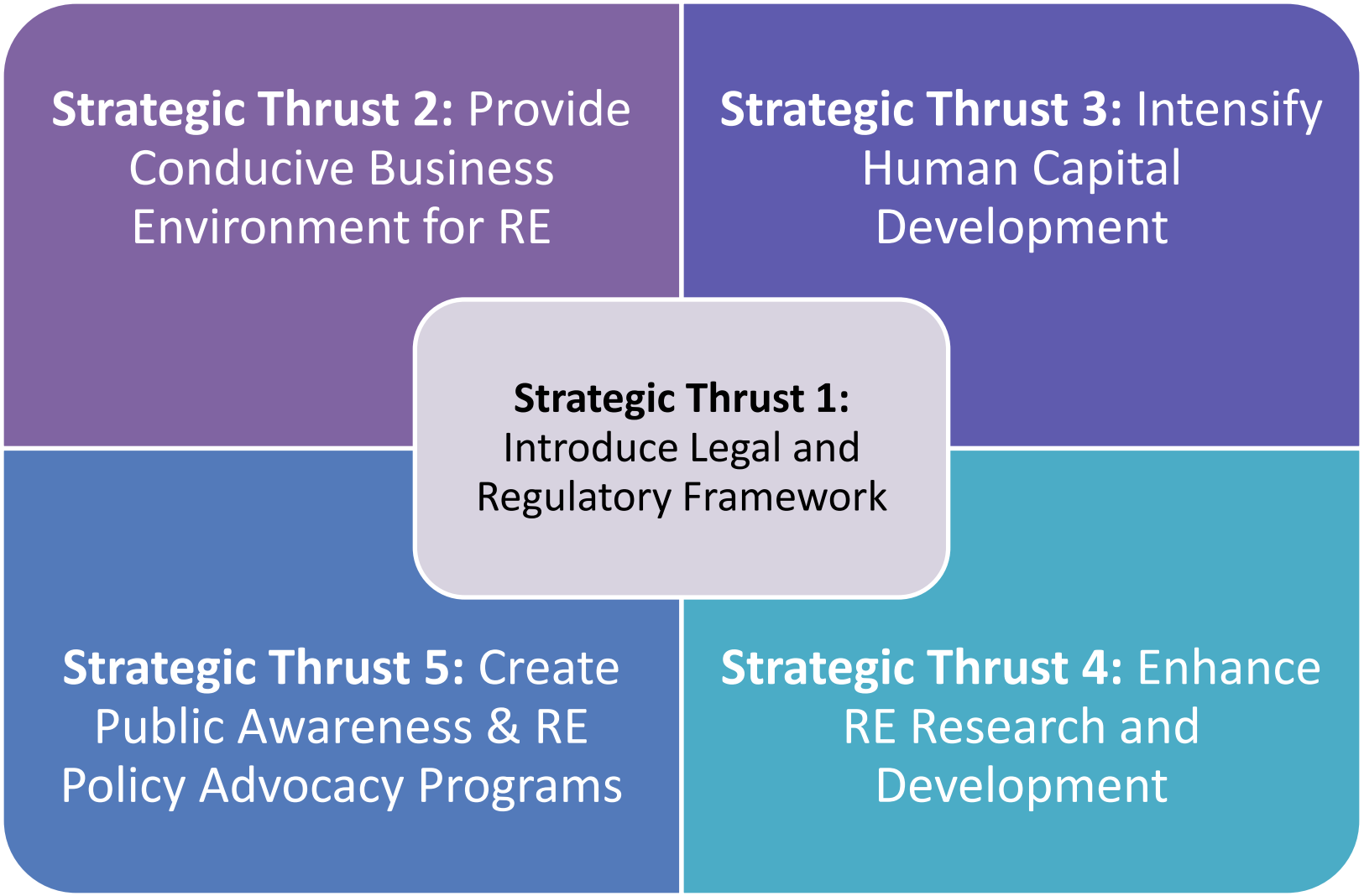
- **Entry Point Project (EPP) 10:**

  Solar Power Capacity Initiative under *National Key Economic Area* (NKEA)

- **Target - 1.25GW solar power capacity connected to the grid by 2020**

Year	Solar Power Capacity (Cumulative)	RE Capacity (Cumulative)	RE Capacity Mix
2011	20MW	219 MW	1%
2015	295MW	1,275 MW	7%
2020	1,250MW	3,140 MW	14%
2030	3,100MW	7,088MW	25%

Strategic Thrusts of Malaysian National RE Policy



Strategic Thrust 1: Introduce Legal And Regulatory Framework

- Renewable Energy Act 2011 – established the implementation of Feed in Tariff and RE Fund to finance the FIT
  - Subsidiary Regulations to explain the implementation of the FIT in detail
  - Technical & Operational Rules - in consultation with EC
- SEDA Act 2011 – establish the setting up of SEDA to oversee the management of the FIT

Strategic Thrust 2: Provide Conducive Business Environment for RE

- **The Feed-in Tariff (FiT)**
- A mechanism that allows electricity that is produced from indigenous RE resources to be sold to power utilities at a fixed premium price and for specific duration.
- Provides a conducive and secured investment environment which will make financial institutions comfortable in providing loans with longer period (>15 years).
  - Provides fixed revenue stream for installed system
  - Only pays for electricity produced: promotes system owner to install good quality and maintain the system
  - With suitable degression rate, manufacturers and installers are encouraged to reduce prices while enhancing quality

Critical Factors for an Effective FiT Implementation

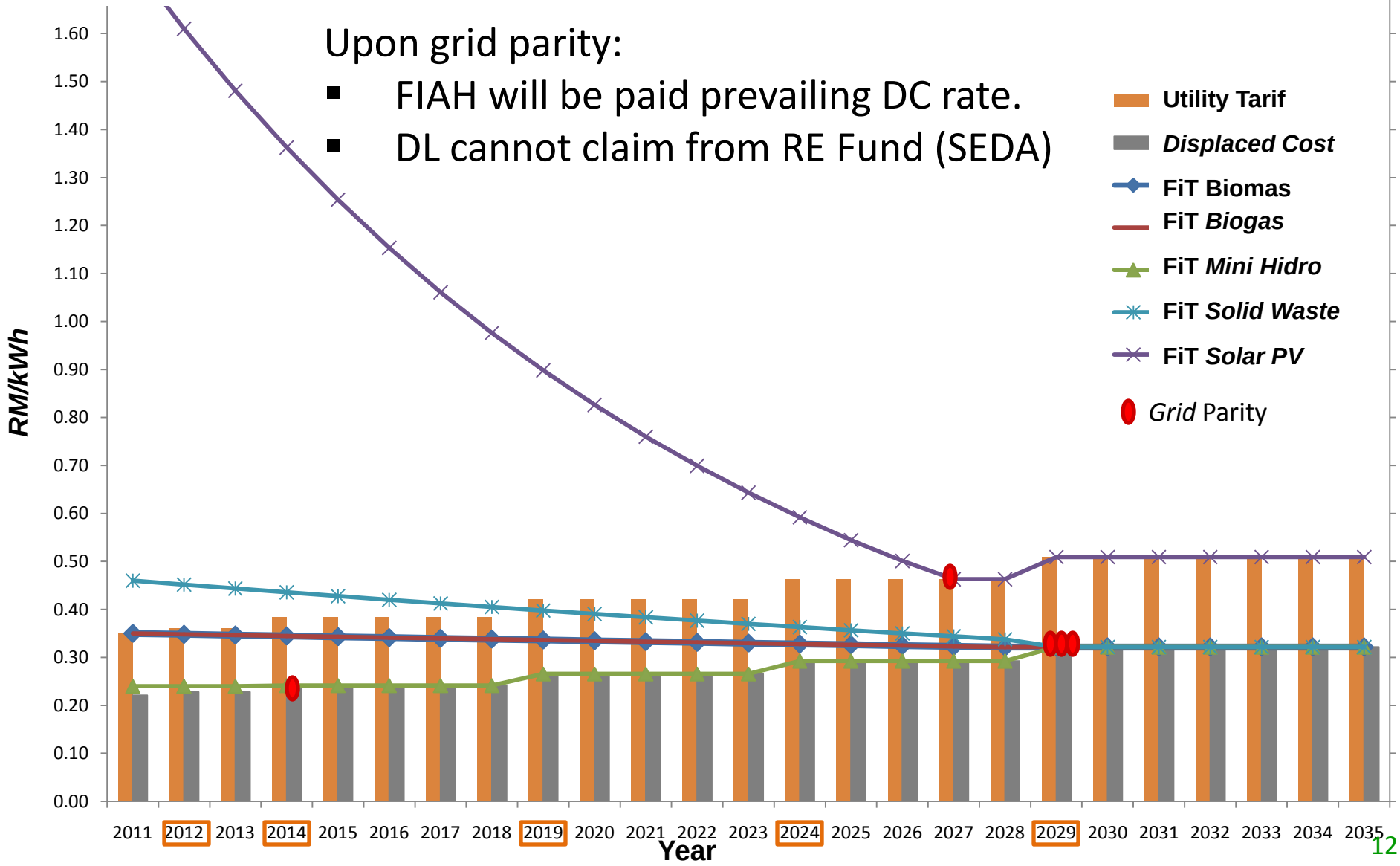
FiT is guaranteed via the RE Act, whereby:

- Access to the grid is guaranteed – utilities legally obliged to accept all electricity generated by RE private producers subject to safety considerations
- Local approval procedures are streamlined and clear
- FiT rates
  - high enough to produce ROI + reasonable profit (not excessive) to act as an incentive
  - fixed for a period (typically 16 or 21 years) to give certainty & provide businesses with clear investment environment
  - adequate "degression" to promote cost reduction to achieve “grid parity”
- Adequate fund is created to pay for the FiT rates & guarantee the payment for the whole FiT contract period
- Implementation by a competent agency for constant monitoring, progress reporting and transparency

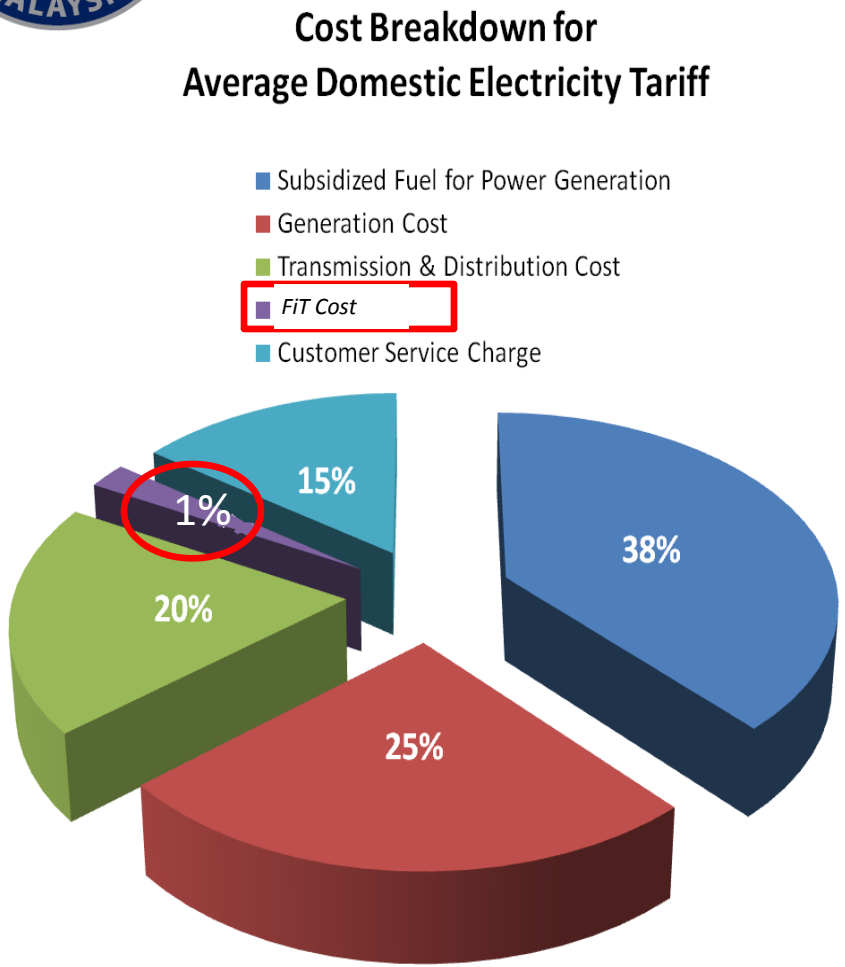
Degression & Grid Parity (Projected)

Upon grid parity:

- FIAH will be paid prevailing DC rate.
- DL cannot claim from RE Fund (SEDA)



Source of Fund for FiT



Source of Funding

- Starting Dec 2011 - additional 1 % tariff collection from electricity bills
  - Domestic consumers < 300 kWh/month exempted
- Additional 1% proposed in Jan 2013

The size of RE fund will determine the RE target for Malaysia

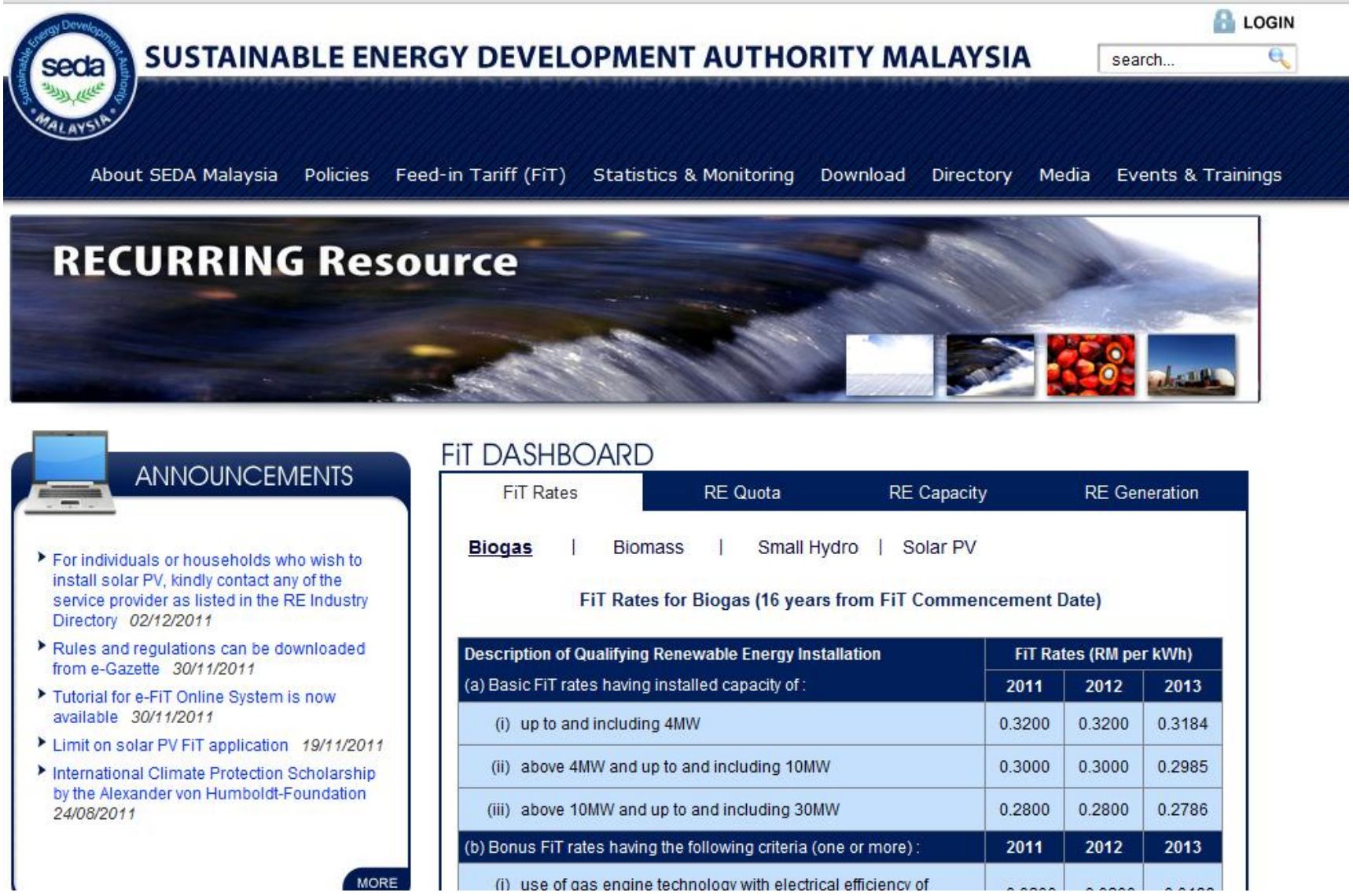
Benefit

- Polluters pay concept
- Will not affect low income consumers
- Encourages EE and DSM

Potential Impact of National RE Policy by Year 2020

- Minimum **RM 2.1 billion savings of external cost** to mitigate CO2 emissions (total 42 million tons avoided from 2011 to 2020, on the basis of RM 50 per ton of external cost);
- Minimum **RM 19 billion of loan values** for RE projects, which will provide local banks with new sources of revenues (at 80% debt financing for RE projects);
- Minimum **RM 70 billion of RE business revenues** generated from RE power plants operation, which can generate **tax income of minimum RM 1.75 billion to Government;**
- > **50,000 high income jobs created** to design, construct, operate and maintain RE power plants (on the basis of 15-30 job per MW).

e-FiT Online



Description of Qualifying Renewable Energy Installation	FiT Rates (RM per kWh)		
(a) Basic FiT rates having installed capacity of :	2011	2012	2013
(i) up to and including 4MW	0.3200	0.3200	0.3184
(ii) above 4MW and up to and including 10MW	0.3000	0.3000	0.2985
(iii) above 10MW and up to and including 30MW	0.2800	0.2800	0.2786
(b) Bonus FiT rates having the following criteria (one or more) :	2011	2012	2013
(i) use of gas engine technology with electrical efficiency of			

Annual RE Quota 2012-2014

Year	Biogas	Biogas - Sewage	Biomass	Solid-Waste	Small Hydro	Solar PV < 1MW	Solar PV > 1MW	Total
	MW	MW	MW	MW	MW	MW	MW	MW
2011/ 2012	20	10	60	20	30	10	40	190
2013	20	10	50	30	30	10	40	190
2014	20	10	50	30	90	10	40	250

The FiT quota – as at 16th Feb 2012

Available MW installed capacity for FiT Application	2011 / 2012		2013		2014	
	H1	H2	H1	H2	H1	H2
Biogas	8.26	7.35	10	10	10	TBA
Biogas (Landfill / Sewage)	0	0.88	0	5	5	TBA
Biomass	0	5.58	6.06	25	18.94	TBA
Biomass (Solid Waste)	3.71	10	15	15	15	TBA
Small Hydro	3.10	12.02	4.67	6.04	22.64	TBA
Solar PV						
Individual (< 12 kW)	0	0	0.34	2.28	2.5	TBA
Non-individual (< 500 kW)	0	0	0	0	0	TBA
Non-individual (> 1 MW, < 5 MW)	0.48	0.46	0.55	0.52	0.35	TBA

Provide Conducive Business Environment – Workshops for Stakeholders

- Issues which impede RE development include
  - Lack of understanding on the technology among potential developers
  - Delays in getting permits from the various authorities
  - Lack of financing for RE projects
- To address these issues, SEDA will conduct workshops for the various stakeholders
  - To impart knowledge and increase confidence level
  - Ensure smooth process and transparency in permit approvals

Strategic Thrust 3: Intensify Human Capital Development

The Problems

- Malaysia lacking in human resources to fully exploit RE
  - Design engineers
  - Construction technical personnel and project managers
  - Operations staff
  - Maintenance experts
- Biomass - boiler and turbine designs to suit local feedstock, MSW, gasification technology
- Biogas - enrichment techniques to ensure adequate supply of gas from landfills and POME
- Hydro – Optimization of design, operations and maintenance issues
- Solar PV – design and installation

Strategic Thrust 3: Intensify Human Capital Development

The Plan

- SEDA to identify suitable local technology partners
  - Universities, government-linked institutes
- Local partner to acquire foreign technology and expertise through collaboration with established foreign institution
- SEDA to accredit local partner for the following roles:
  - Carry out training and capacity building for design engineers and technical personnel
  - Verify plant engineering design submitted by FIT applicant
  - Witness testing and commissioning of plant to ensure conformation with design specs
  - Perform periodic inspection to ensure plant maintains declared efficiency levels throughout the FIT contract period

Strategic Thrust 4: Enhance RE Research and Development

- New technologies
  - At present only 4 technologies qualify for FIT
  - SEDA will encourage research on other technologies which may be included in the FIT in future
  - This year SEDA to initiate comprehensive wind mapping exercise and geothermal study
  - Initial study by Dept. of Minerals and Geosciences shows at least 400 MW geothermal potential in Sabah – negates the need for a coal-fired plant

Existing technologies

- Biomass
  - Estimated potential based on EFB and other agricultural waste is 1340 MW
  - SEDA to encourage other forms of biomass
    - Bamboo and secondary jungle with replanting program
    - 4 MW biomass plant using bamboo approved for FIT in Perak
    - Estimated total capacity of 100 MW at this site alone
    - With replanting techniques, a few GW potential – contribute to energy security
  - Estimated potential from MSW is 420 MW
    - Proper management of landfills and segregation of waste at source can double this potential

- Biogas
  - Estimated 400-800 MW from POME and smaller amount from landfills and sewage
  - Most palm oil mills not interested in power generation from POME due to grid connection problems; SEDA will help facilitate
- Hydro
  - Conventional estimates about 500 MW of small hydro potential
  - SEDA proposes that a comprehensive study of the total small hydro resource in Peninsula Malaysia be undertaken, taking into account low head technologies
  - With this info, state governments can call for bidding for particular sites they want to develop – state governments play an active role rather than waiting for developers to apply
  - SEDA will ensure optimum utilization of the resource through design verification process.

- Solar PV
  - Theoretically potential is limited only by land or rooftop availability
  - In reality grid connection is a problem
    - For large plants connecting to the MV network
    - For high penetration of small rooftop PV in a given location
  - Malaysia has high solar radiation and theoretically can produce high levels of PV generation
  - In reality, tropical cloud cover causes erratic generation patterns
  - Not suitable for either base load or peaking plant
  - PV prices continue to fall but still high when compared to the low capacity factor

- EPP 10 target of 1.25 GW by 2020 difficult to achieve with present size of RE Fund
- FIT quota designed more to develop human capacity in PV, not so much as alternative power source at present
- SEDA to encourage research in inverter systems with storage
  - PV plant can serve as peaking plant during mid-day peak, reduce TNB reliance on distillate during gas curtailment periods
  - Contribution from TNB and also part of gas subsidy to the RE Fund will help accelerate this, SEDA can propose bonus tariff for storage
  - At present inverter systems with 1 MW storage are available, capable of providing 1 MW for up to 30 sec if PV generation drops to zero due to sudden cloud

Strategic Thrust 5: Create Public Awareness & RE Policy Advocacy Programs

- Participation in conferences, seminars and other public events to further energy sustainability agenda
- Energy sustainability awareness campaigns in schools
- Proposal to BEM to include core course in sustainable energy for all engineering undergrads

Thank you for your attention

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