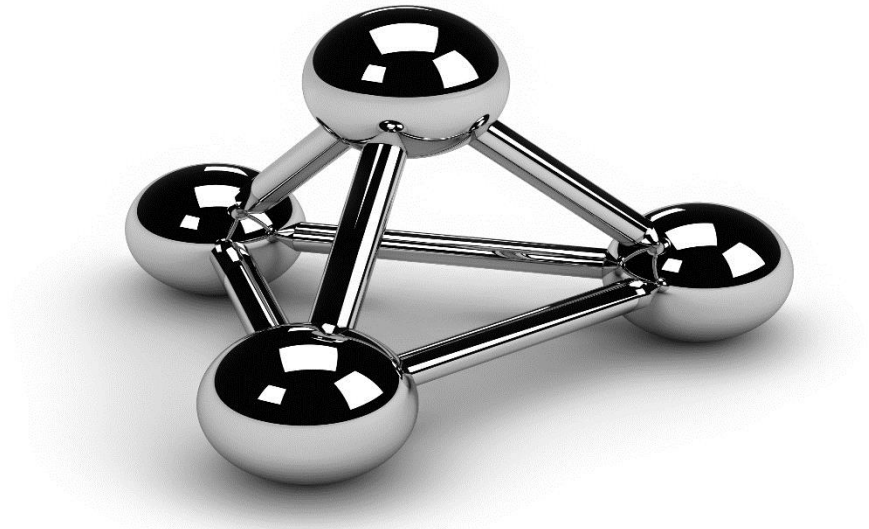


# Myanmar Power Sector Financial Analysis and Viability Action Plan

## Key Findings & Recommendations



**18<sup>th</sup> May 2016**

# Contents of this Presentation

- Background
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# Background

Deloitte was appointed as a Consultant to support Myanmar Electric Power Enterprise (MEPE) with the following objectives:

Inform stakeholders on the financial status and outlook of the power sector, including revenue requirements and any subsidy requirements for generation, transmission and distribution subsectors

Assist the Myanmar authorities in preparing a power sector financial viability action plan

Increase institutional capacity of Myanmar power sector enterprises to carry out forward-looking financial analysis of the power sector

Develop an integrated financial model for forward-looking financial analysis of the power sector--covering generation, transmission and distribution subsectors

# Performance analysis of state owned enterprises

## Profitable past despite headwinds

Sector on the whole had stayed profitable despite a decline in profitability



- Higher proportion of depreciated hydro power assets in the power mix led to substantially lower historical cost of generation

- System energy losses have been under check

- Preferential gas pricing till 2015

- Consistent tariff increases to the tune of 21% y-o-y growth from FY12 to FY15

HPGE+MEPE+YESB +ESE		FY14 Per unit Sale (Kyat/kWh)	FY14 (Mn Kyat)	FY15 Per unit Sale (Kyat/kWh)	FY15 (Mn Kyat)
Rev/Sales	(1)	52.84	507,859	74.16	834,644
(PP+Own Gen)/Sales	(2)	37.23	357,852	57.94	652,076
Others/Sales	(3)	9.04	86,868	12.22	137,493
PBT/Sales	(4) = (1) – (2) - (3)	6.57	63,139	4.00	45,075

Increasing proportion of gas based power plants (such as rentals and IPPs) is altering the cost structure of the industry, leading to a declining trend in profitability.



- Tariffs for gas-based power are close to Ky 105/kWh

- Revenue realized by MEPE from sale of each unit of power to YESC, ESE is only Ky 54.24/kWh in FY15

- Revenue realized from consumer is Ky 74.2/kWh in FY15

# Financial Analysis of the sector

## Demand Analysis

### A constrained supply case

- Demand projections based on “Myanmar Energy Master Plan”, prepared under ADB support in 2016
- Projected supply is not sufficient to meet this demand

Particulars (GWh)		FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
<b>Demand</b>		<b>12476</b>	<b>13885</b>	<b>15454</b>	<b>17089</b>	<b>18897</b>	<b>20896</b>	<b>23048</b>	<b>25422</b>	<b>28040</b>	<b>30861</b>
Energy Generation	a	15259	16703	16773	17634	20926	24685	27135	29829	30163	30251
Transmission Loss	b	3.1%	3.0%	2.9%	2.8%	2.8%	2.7%	2.7%	2.6%	2.6%	2.5%
Energy Avl for YESC & ESE	$c=a*(1-b)$	14780	16202	16287	17140	20350	24018	26416	29053	29394	29495
Distribution Loss	d	15.6%	14.8%	14.2%	13.7%	13.4%	13.0%	12.8%	12.5%	12.3%	12.0%
<b>Available Energy for Sale</b>	$e=c*(1-d)$	<b>12476</b>	<b>13796</b>	<b>13969</b>	<b>14784</b>	<b>17629</b>	<b>20896</b>	<b>23048</b>	<b>25422</b>	<b>25794</b>	<b>25955</b>

## Investments required in the Sector in next 10 years

7000 Bn Kyat out of 20,000 Bn Kyat is expected to come from GoM

*Private sector is expected to play a pivotal role in realizing this sector's growth and most of these investments currently envisaged in developing hydro projects*

Particulars (Bn Kyat)	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	Total
<b>Generation</b>											
For plants commissioning between FY16 to FY25 - EPGE	126	111	94	38							<b>368</b>
For plants commissioning between FY16 to FY25 - IPPs	438	889	1005	1077	871	519	308	55	55		<b>5216</b>
For plants commissioning between FY26 to FY30 - IPPs					442	442	1118	1342	1773	2107	<b>7224</b>
For peaking plants to meet unconstrained demand between FY16 to FY25	102	151	55					169	169	25	<b>671</b>
<b>Total Generation</b>	<b>666</b>	<b>1150</b>	<b>1154</b>	<b>1114</b>	<b>1313</b>	<b>961</b>	<b>1427</b>	<b>1567</b>	<b>1997</b>	<b>2132</b>	<b>13480</b>
Transmission - PTSCD	193	412	412	412	412	248	248	248	248	248	<b>3085</b>
Distribution - YESC + ESE	115	147	175	239	341	408	465	522	568	612	<b>3592</b>
<b>Grand Total</b>	<b>973</b>	<b>1710</b>	<b>1741</b>	<b>1765</b>	<b>2066</b>	<b>1618</b>	<b>2140</b>	<b>2337</b>	<b>2813</b>	<b>2992</b>	<b>20157</b>

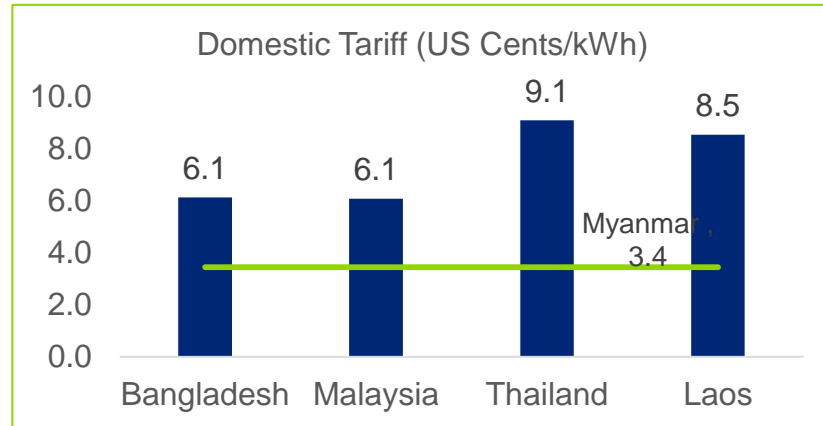
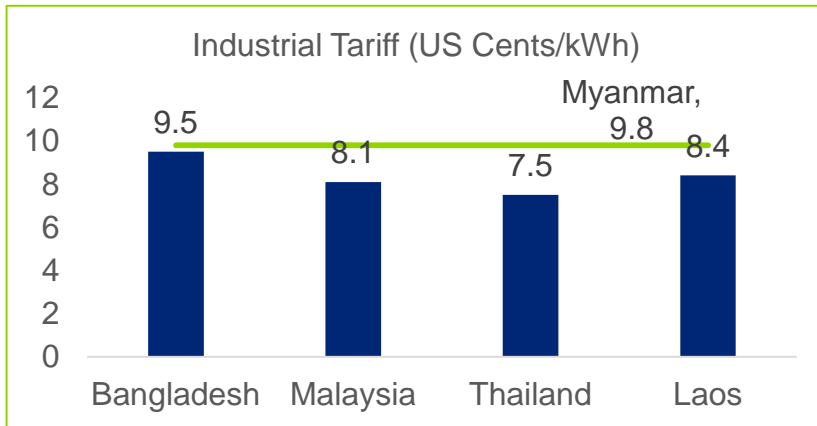
Additional capital expenditure of 167 Mn USD is by Government / Local communities for last mile connectivity as part of National electrification Project from 2016 to 2020



# Tariff and Subsidy – the two levers of financial sustainability

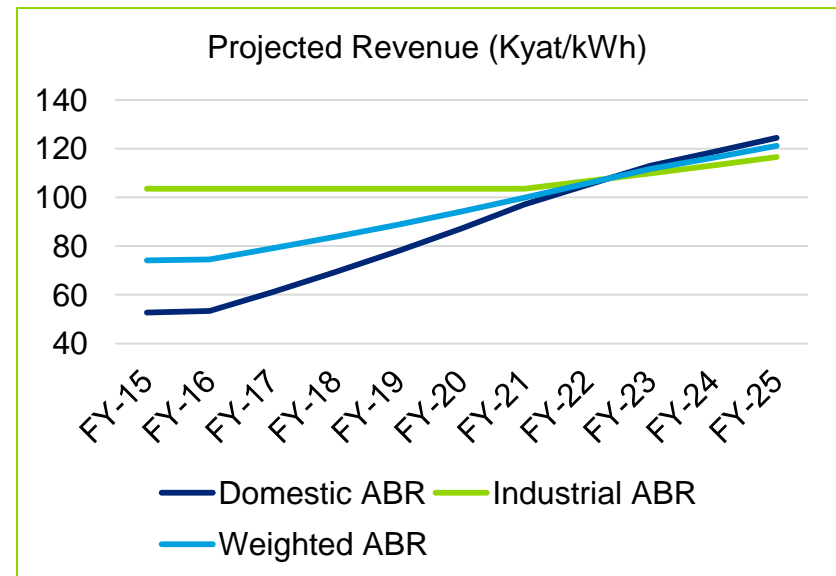
## Interim losses to be borne by sector through means of subsidy

Significant scope for moving towards cost reflective tariff for domestic consumers



### Assumptions used for Financial Analysis

- **Domestic Tariff:** An increase of 12% per annum over next 5 years to bridge the regional benchmark.
- **Industrial Tariff:** Zero increase for next 5 years; sub-inflation 3% revision in tariff per annum over subsequent 5 years
- The above results in an overall weighted average increase of 6% per annum



## Sector shall be dependent on subsidy

*Operating Subsidy Requirement of ~4600 Bn Kyat over next 10 years*

Particulars	Units	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
<b>Cost Recovery Revenue</b>											
Generation	Kyat/kWh	82.9	83.7	80.4	78.6	79.3	75.9	75.2	74.3	74.7	74.9
Transmission	Kyat/kWh	10.2	14.3	18.5	20.2	18.3	16.4	15.7	14.9	15.9	16.9
Distribution	Kyat/kWh	120.1	125.9	128.2	129.5	128.5	122.7	122.5	121.6	126.1	130.8
<b>Tariff Considered</b>											
Generation	Kyat/kWh	54.4	57.7	61.2	64.8	68.7	72.8	75.2	74.3	74.7	74.9
Transmission	Kyat/kWh	0.0	10.8	11.4	12.1	12.8	13.6	14.4	14.9	15.9	16.9
Distribution	Kyat/kWh	74.6	79.1	83.8	88.8	94.2	99.8	105.8	111.7	116.3	121.1
<b>Subsidy Required</b>											
Sector	Bn Kyat	583	640	614	595	600	474	381	251	250	248

- *Average y-o-y subsidy requirement is approximately 0.5% of Myanmar's GDP in FY17; 3.4% of the Union Budget in FY17.*
- *Subsidy requirement (or alternatively the tariff increases) shall increase by 3.1 times if devaluation of Kyat is assumed at 10% per annum.*
- *Subsidy administration at single buyer (EPGE) level is however a preferred option*

# Action items to further improve financial viability

## Action Items

### Power Generation is a key area to focus for improvements and reduce costs

Action Plan	Rationale	Likely Impact
Replacement/Rehabilitation of old and inefficient Plants	MEPE's own gas plants are running at an average PLF of 34% - 40% and average net heat rate of around 15,000 BTU/kWh	Improvement of SHR to 8,000 BTU/kwh along with an increase in PLF to 75% by FY18 reduces subsidy dependence by 35%
Policy for preferential pricing of gas for domestic usage	Natural Gas pricing for domestic power generation may not be appropriate to price simply at the opportunity cost of exports.	E.g., gas price to \$ 5 / MMBTU could reduce the subsidy requirement by 50%
Ensuring timely completion of hydro Power plants	Delay in commissioning of hydro plants will have an adverse impact in consumer tariff as the sector will then have to depend on expensive power from gas based rental projects to meet the demand.	Delay in planned hydro plants by 1 or 2 years can increase the subsidy requirement by 30%

## Action Items

### Commission detailed studies to improve O&M across G,T, D

Action Plan	Rationale	Likely Impact
<p>Measures such as improved maintenance schedules, timely R&amp;M of generation plant, equipment etc. and technology interventions in deploying O&amp;M practices in power plants</p> <p>Transition to out-sourced LTSA arrangements for O&amp;M needs to be explored</p>	<p>O&amp;M expenses in the past have increased at an alarming rate, much above industry benchmarks.</p>	<p>A 20% reduction in O&amp;M prices can reduce subsidy requirement by 10%</p>
<p>Detailed study for adoption of technology and out-sourcing of O&amp;M activities needs to be undertaken for PTSCD</p>	<p>O&amp;M expenses found to be high and the same has been increasing at an alarming rate in the past years</p>	
<p>An accelerated distribution loss reduction</p>	<p>A reducing loss trajectory is key to future sustainability. Increasing access may lead to increase in losses</p>	<p>Failure to reduce AT&amp;C loss by 1% from assumed trajectory will lead to an increase of ~1% subsidy requirement</p>

## Action Items

### Other necessary measures from Long Term perspective

Action Plan	Rationale	Likely Impact
Need for a dedicated regulator	<p>To scrutinize all costs incurred by the sector utilities and move the sector towards adoption of best practices.</p> <p>Long-term predictability in tariffs.</p>	<p>Clear policies and improvement trajectories for the sector and improved predictability shall enhance private participation &amp; consumer satisfaction.</p>
Establishing the Transmission function as a state owned entity / company	<p>With sizeable investments being projected in the transmission sector, it is recommended to corporatize PTSCD going forward.</p> <p>Resource mobilization and bringing in PPP could be easier.</p>	<p>Independent transmission is at the heart of the electricity competition and market operations;</p> <p>Helps in specialization, autonomy and accountability in transmission construction &amp; operation.</p> <p>Creates the bedrock for private participation across the value chain.</p>
Pass-through of transmission expenses to the end-user	<p>Transmission unitary charges to be transferred to distribution utilities and ultimately charged to the consumers</p>	<p>Reduces burden on Government budget</p>

## Action Items

### Other necessary measures from Long Term perspective

Action Plan	Rationale	Likely Impact
Moving towards a progressive Tariff structure	Bring down the cross-subsidy across categories and less burden the subsidizing categories	Progressive tariff structures like Time of Day tariff or KVAH tariff, etc. incentivizes consumers to decrease load during peak hour or reduce inductance load.
Implementation of DSM and EE Measures	Provides directional shifts to leapfrog adoption of beneficial technologies  Leads to market mechanisms for increasing penetration of EE / DSM measures	Quicker adoption of smart grids and EE technologies such as LEDs for lighting, standards for equipment, etc.
Increasing Renewable Energy in the Energy Mix	Reduces dependence on costly (and inflationary) fossil fuels like natural gas and coal	Reduces cost recovery tariff and hence subsidy requirement in the long-run.

Thank You !



# Annexure

# Supply Assumptions

## Available Generation Capacity - As assumed in the model

Type of Plant*	Units	FY15 (A)	FY16(P)	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
<b>Gas</b>												
MOEP - Own Plants	MW		0	50	50	68	0	0	0	0	0	0
IPP - Negotiated	MW		138	0	0	0	0	0	0	0	0	0
IPP - Bidding	MW		0	0	0	0	230	0	0	0	0	0
Rental	MW		99	-71	122	160	160	160	160	160	800	1000
Total – Gas	MW		237	-21	172	228	390	160	160	160	800	1000
Cumulative	MW	1411	1648	1627	1799	2027	2417	2577	2737	2897	3697	4697
Generation	GWh	5069	6301	7448	7220	7814	9385	8952	9143	9138	9385	9385
<b>Hydro</b>												
MOEP - Own Plants	MW		0	0	0	51	491	1050	480	0	0	0
IPP – Negotiated	MW		0	0	0	0	0	146	140	745	0	0
Total – Hydro	MW		0	0	0	51	491	1196	620	745	0	0
Cumulative	MW	3151	3151	3151	3151	3202	3693	4889	5509	6254	6254	6254
Generation	GWh	8683	8908	9205	9415	9594	11315	15507	17679	20290	20290	20290
<b>Coal</b>												
MOEP - Own Plants	MW		0	0	0	0	0	0	0	0	0	0
IPP – Negotiated	MW		0	0	0	0	0	0	0	0	0	0
Total – Coal	MW		0	0	0	0	0	0	0	0	0	0
Cumulative	MW	120	120	120	120	120	120	120	120	120	120	120
Generation	GWh	50	50	50	50	50	50	50	50	50	50	50
<b>Solar</b>												
Total-solar	MW		0	0	50	50	0	0	50	50	50	50
Cumulative	MW	0	0	0	50	100	100	100	150	200	250	300
Generation	GWh		0	0	88	175	175	175	263	350	438	526
<b>Total</b>												
Capacity Addition	MW		237	-21	222	329	881	1356	830	955	850	1050
Cumulative	MW	4682	4919	4898	5120	5449	6330	7686	8516	9471	10321	11371
<b>Available Generation</b>	<b>GWh</b>	<b>13802</b>	<b>15259</b>	<b>16703</b>	<b>16773</b>	<b>17634</b>	<b>20926</b>	<b>24685</b>	<b>27135</b>	<b>29829</b>	<b>30163</b>	<b>30251</b>

# Financing Assumptions

## **Capex Funding:**

- Development financing in general shall be available on a priority for most of the debt requirements of the state owned enterprises (SOEs).
  - 75% of the capex through Multilateral Development Banks (MDBs) like World Bank, ADB, JICA, KFW, etc. and
  - 25% of the capex through contribution from the Government, SOEs or the private sector through infusing new equity or re-investing the internal resource generation (IRG).

*Demands placed by infrastructure investment of the scale described in previous slide will however place significant burden on public finance, as much of its financing will have to be through foreign debt, with the domestic financial institutions having extremely limited access to finance.*

## **Cost of Debt:**

- Moratorium and repayment period has been assumed to be 5 years and 20 years respectively.
- Interest rate has been assumed to be 3.7%. (USD 6 month LIBOR = 0.8636% as on 17<sup>th</sup> Feb 2016; spread for 20 year ADB loan = 1.986%).

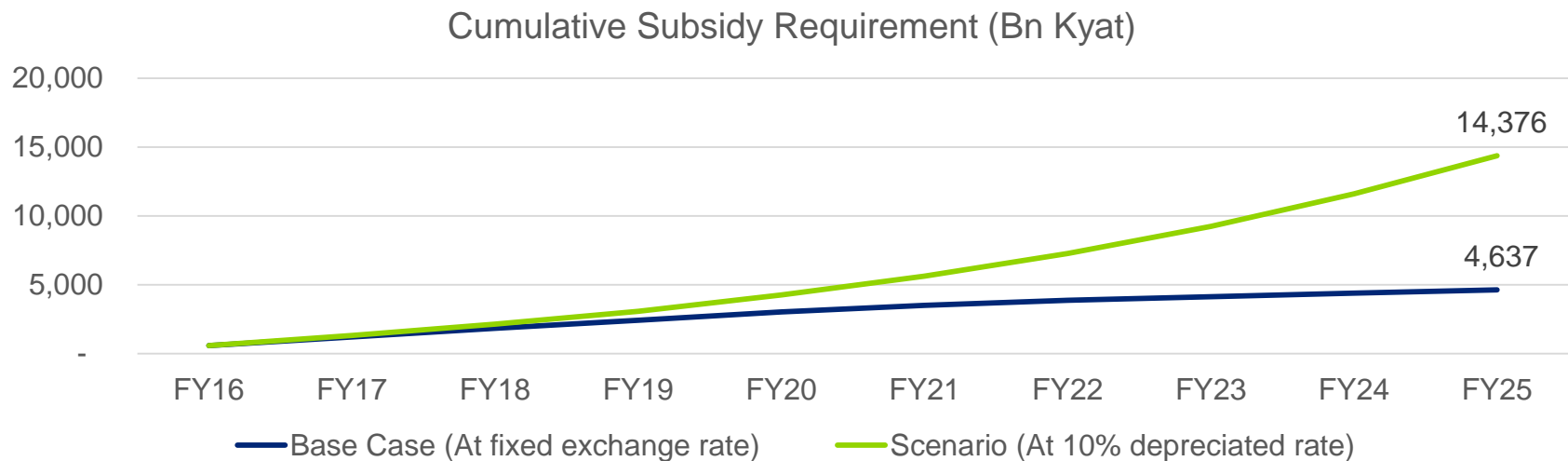
## **Return on Equity (RoE):**

- Return on equity is assumed at 18.65%
- For the transmission business, which is not envisaged to be privatized in the foreseeable future, a lower RoE of 15% has been assumed to reflect a lower risk and return expectations of the GoM

# Subsidy Requirement increases with devaluation of currency

## Assumed devaluation of Kyat by 10% every year

- Kyat was allowed to float against the US Dollars in April, 2013.
- Since then, the currency has depreciated at a CAGR of 8.2% till 1-April-2015
- Assuming 10% depreciation of Kyat, the subsidy requirement is provided in the chart below:



Total subsidy requirement increases by 3.1 times

## Subsidy Administration

*Subsidy administration at single buyer (EPGE) level is a preferred option*

Particulars*	Units	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
<b>Tariff Considered</b>											
EPGE	Kyat/kWh	54.4	44.2	42.6	43.9	49.8	56.2	60.8	65.6	66.2	66.4
PTSCD	Kyat/kWh	0.0	14.3	18.5	20.2	18.3	16.4	15.7	14.9	15.9	16.9
YESC	Kyat/kWh	79.4	84.2	89.2	94.6	100.2	106.3	112.6	118.5	121.4	124.1
ESE	Kyat/kWh	70.1	74.3	78.7	83.5	88.5	93.8	99.4	105.4	111.7	118.4
<b>Subsidy Required</b>											
EPGE	Bn Kyat	421	640	614	595	600	474	381	251	250	248
PTSCD	Bn Kyat	150	0	0	0	0	0	0	0	0	0
YESC	Bn Kyat	0	0	0	0	0	0	0	0	0	0
ESE	Bn Kyat	12	0	0	0	0	0	0	0	0	0
Total	Bn Kyat	583	640	614	595	600	474	381	251	250	248

\* Financial Statements and Key Commercial and Financial Indicators provided in Annexure