KNOWLEDGE PARTNERSHIP WEEK
Partnership Forum: Innovation
for Resilient and Smart Communities
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Overview of the Power Sector in Viet Nam

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ADB

Characteristics of VIE Power Sector (1/2)

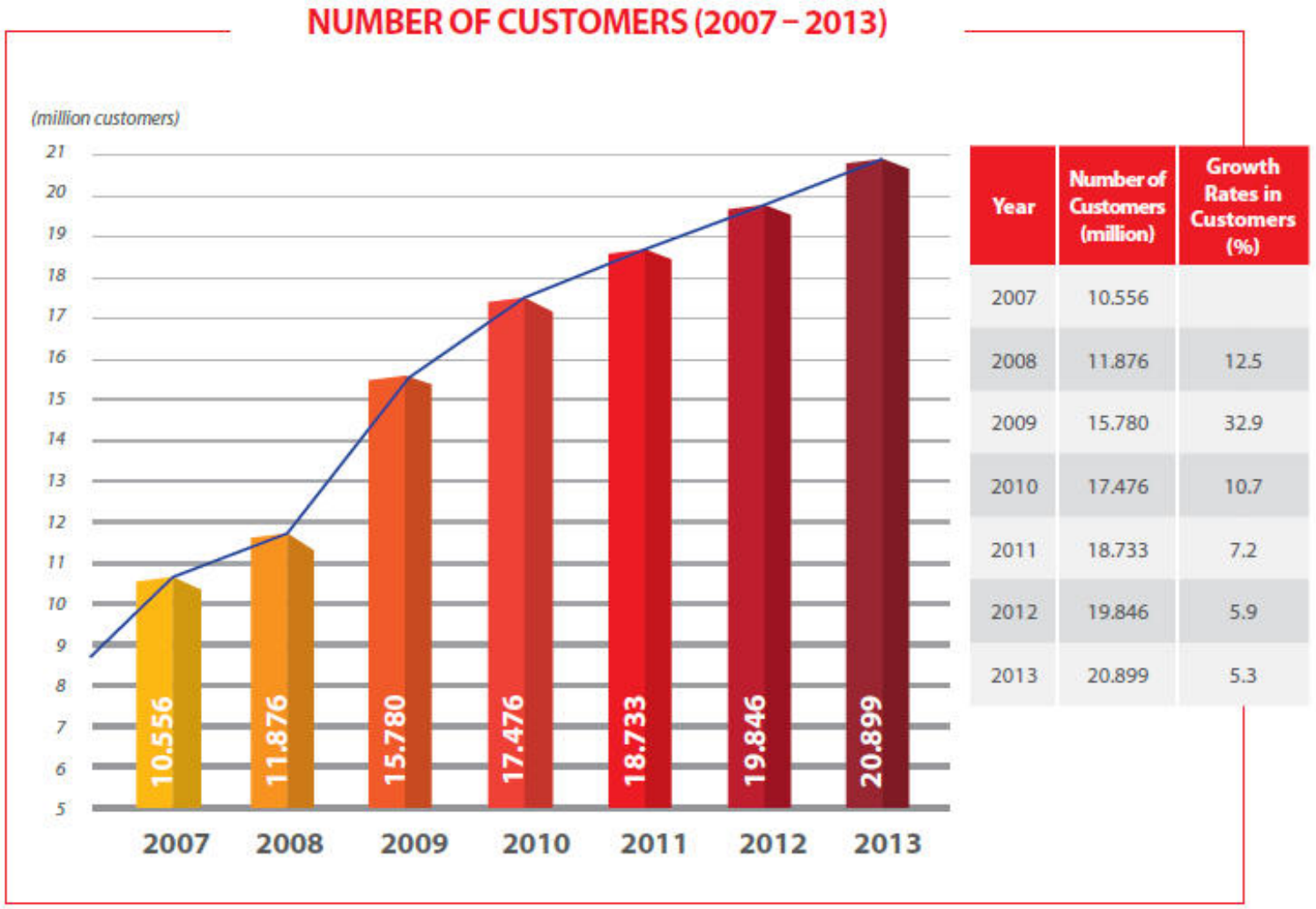
- 34 GW system (2014); historical growth > 10%
- Electrification rate 98%
- Per capita consumption approx 1,000 kWh
- T&D system loss 8.9%
- High SAIDI – 3,000~6,000 mins or more (unreliable data)
- Dominance of SOEs with EVN owning 60% of generation assets (3 GENCOs & JSCs); Other energy SOEs 16%
- EVN subsidiaries: NPT, 5 PCs, NLDC, EPTC, etc.
- Retail tariff ¢7.5/kWh < ¢9.2/kWh LRMC; TOU for industry
- Weak financial position of EVN

Characteristics of VIE Power Sector (2/2)

- Large hydro share (40%); affected by hydrology
- Coal thermal is 23% (2014) but expected to grow
- Gas thermal delayed due to slow gas field exploitation
- Slow RE investment – Wind FIT ¢7.8/kWh

- Ongoing power sector reform
  - VCGM implemented since July 2012
  - VWEM planned to be piloted starting end-2015
  - Retail market to be introduced after 2022

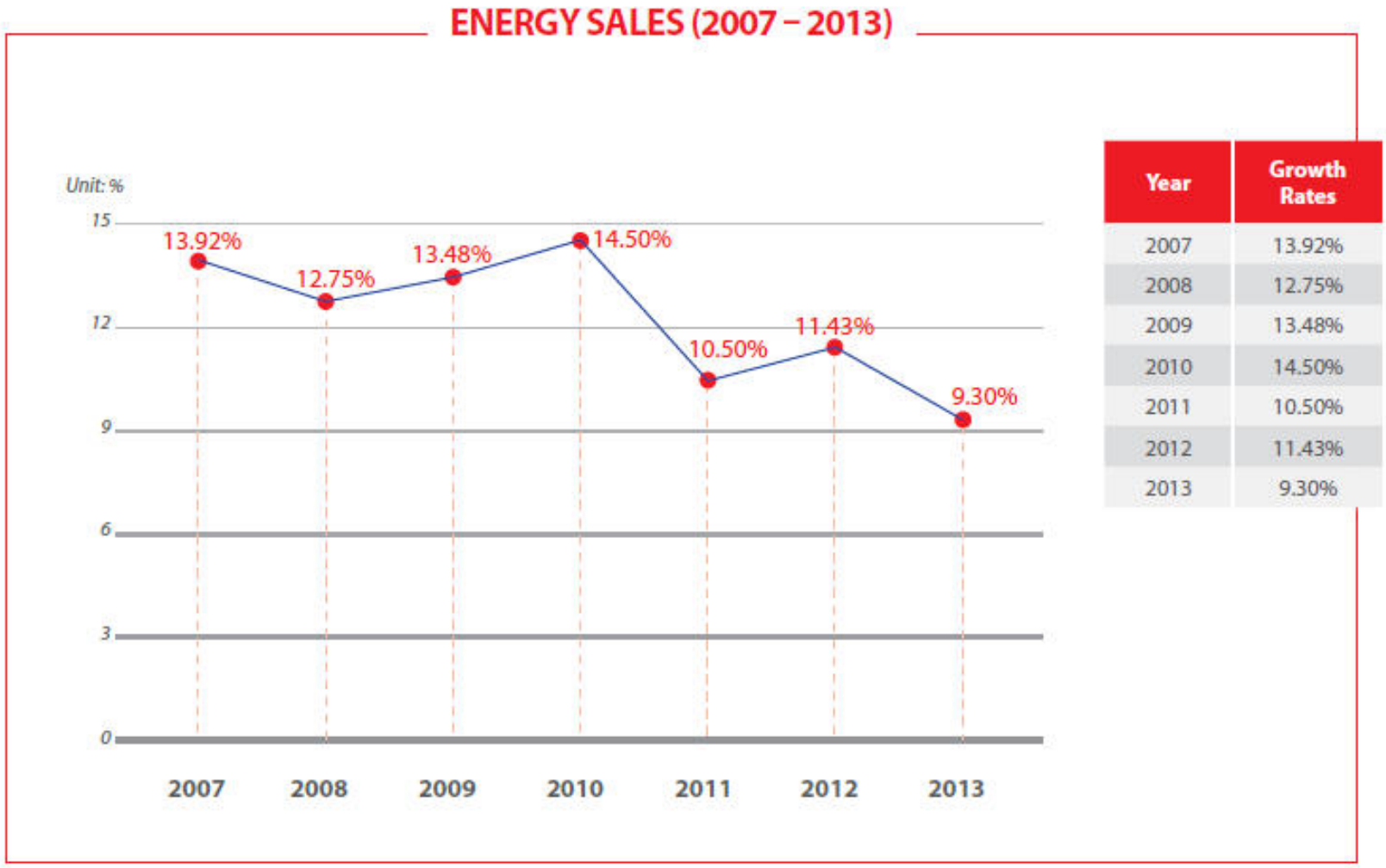
Number of Customers



Year	Number of Customers (million)	Growth Rates in Customers (%)
2007	10.556	
2008	11.876	12.5
2009	15.780	32.9
2010	17.476	10.7
2011	18.733	7.2
2012	19.846	5.9
2013	20.899	5.3

Source: EVN, Annual Report 2012-2013

Energy Sales - Trend

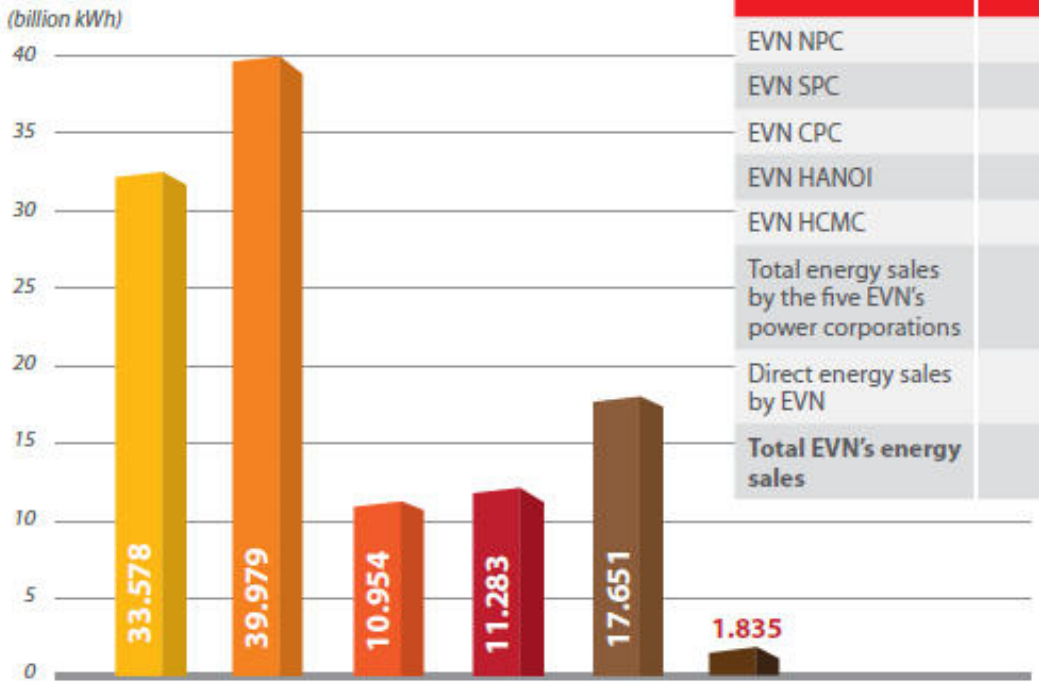


Year	Growth Rates
2007	13.92%
2008	12.75%
2009	13.48%
2010	14.50%
2011	10.50%
2012	11.43%
2013	9.30%

Source: EVN, Annual Report 2012-2013

Energy Sales - 2013

EVN'S ENERGY SALES IN 2013

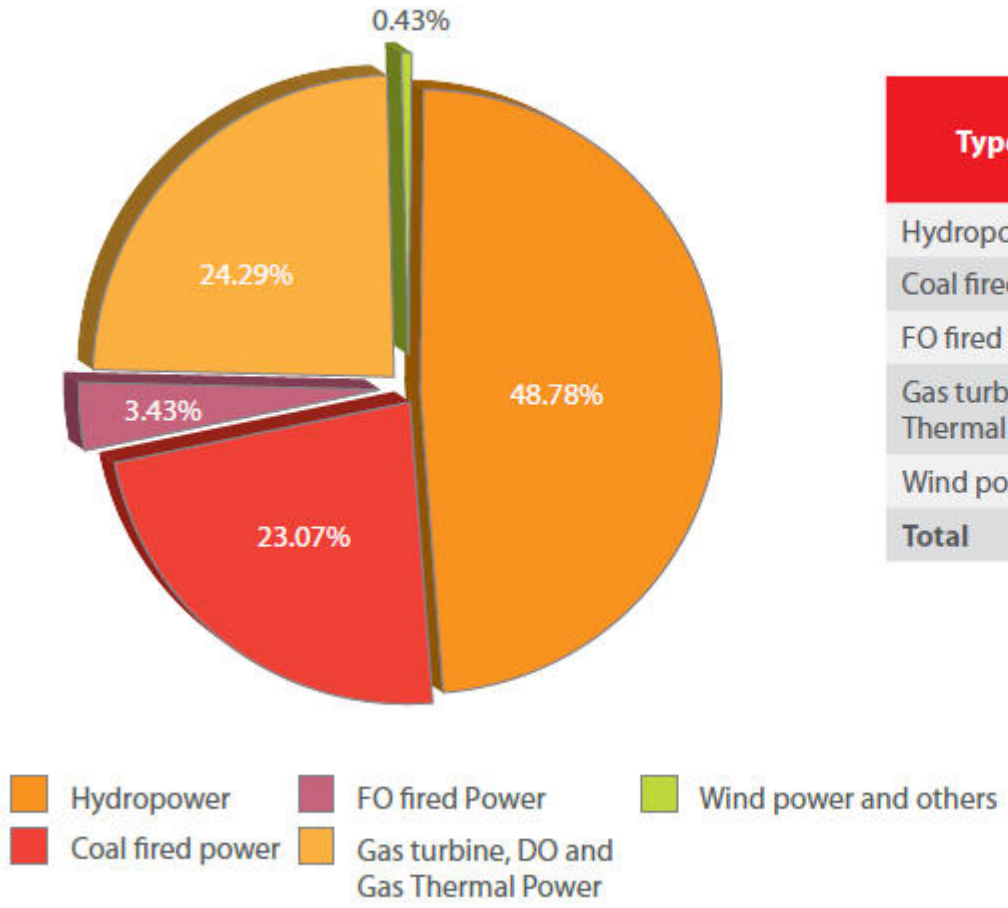


Units	Energy sales in 2013 (TWh)	Increase as compared to 2012 (%)
EVN NPC	33.578	11.54
EVN SPC	39.979	10.17
EVN CPC	10.954	6.61
EVN HANOI	11.283	6.56
EVN HCMC	17.651	5.54
Total energy sales by the five EVN's power corporations	113.447	9.10
Direct energy sales by EVN	1.835	23.14
Total EVN's energy sales	**115.282**	**9.30**

Source: EVN, Annual Report 2012-2013

Power Generation by Type

POWER GENERATION BY INSTALLED CAPACITY IN 2013



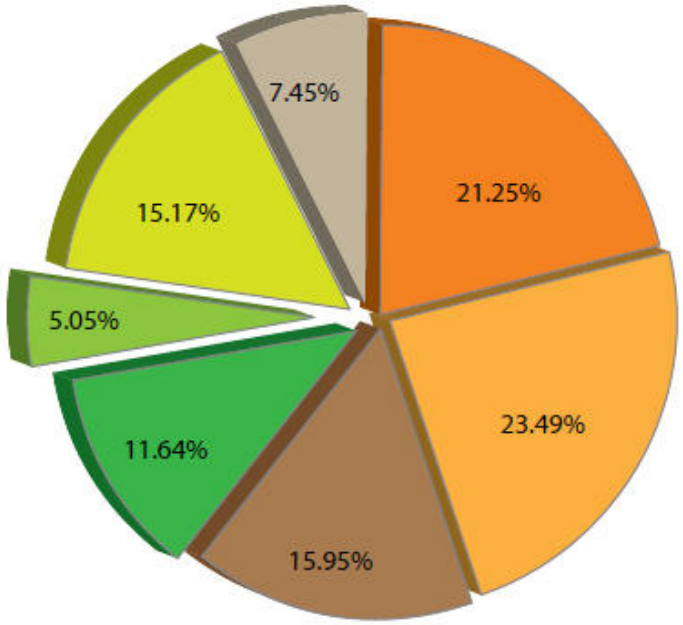
Type of Generation	Installed capacity (MW)	Percentage (%)
Hydropower	14,925	48.78
Coal fired power	7,058	23.07
FO fired Power	1,050	3.43
Gas turbine, DO and Gas Thermal Power	7,431	24.29
Wind power and others	133	0.43
Total	**30,597**	**100.00**

Source: EVN, Annual Report 2012-2013

Power Generation by Ownership

POWER GENERATION BY OWNERSHIP IN 2013

Total installed capacity: **30,597 MW**

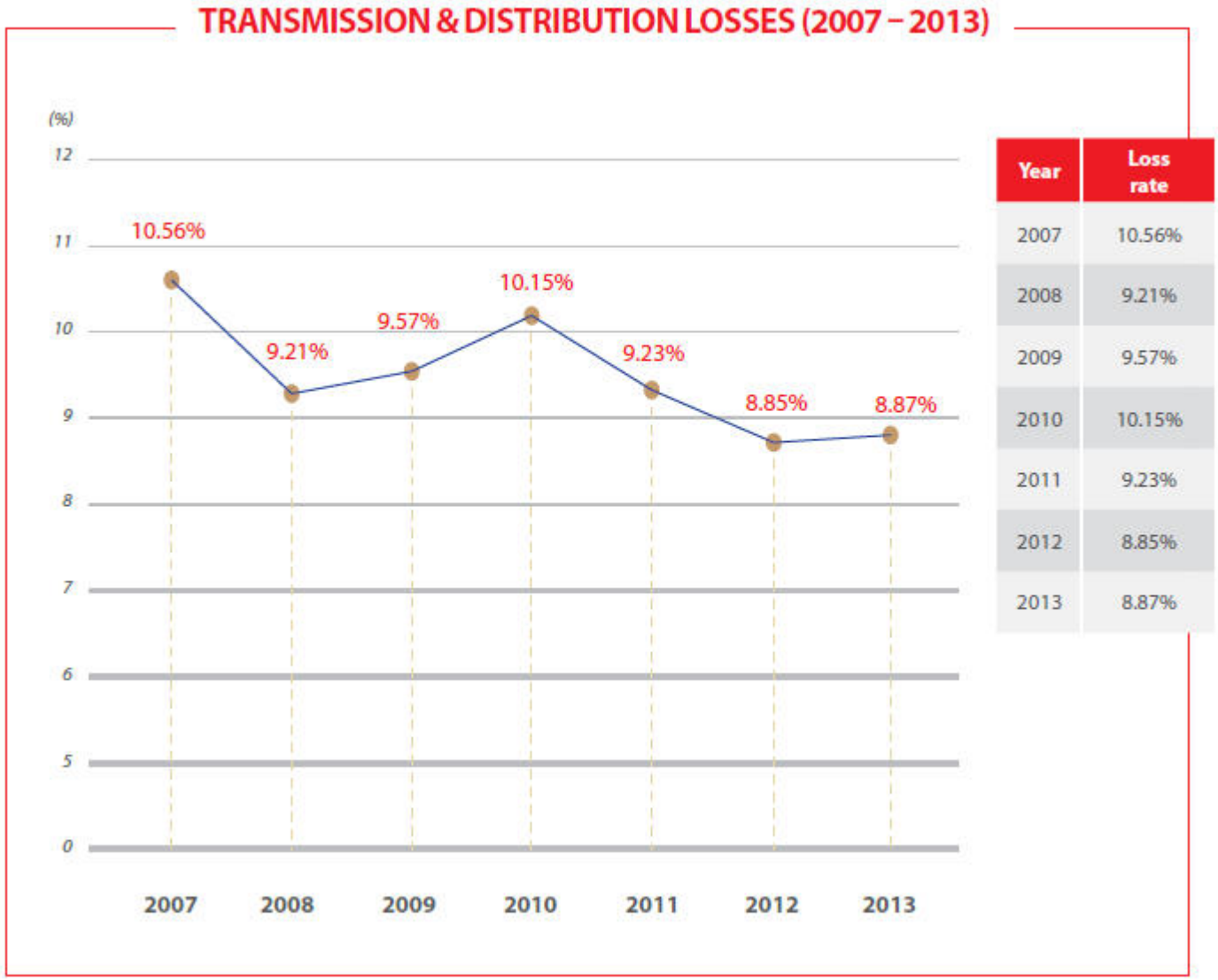


Owner	Installed capacity (MW)	Percentage (%)
EVN	6,502	21.25
EVNGENCO	7,187	23.49
Joint Stocks Co. with EVN-GENCO's shares	4,880	15.95
Petro VN	3,560	11.64
VN Coal & Mineral Co.	1,545	5.05
Domestic Investor	4,642	15.17
Foreign investor	2,281	7.45
Total	**30,597**	**100.00**

EVN
EVNGENCO
Joint Stocks Co. with EVNGENCO's shares
Petro VN
VN Coal & Mineral Co.
Domestic Investor
Foreign investor

Source: EVN, Annual Report 2012-2013

System Losses



Year	Loss rate
2007	10.56%
2008	9.21%
2009	9.57%
2010	10.15%
2011	9.23%
2012	8.85%
2013	8.87%

Source: EVN, Annual Report 2012-2013

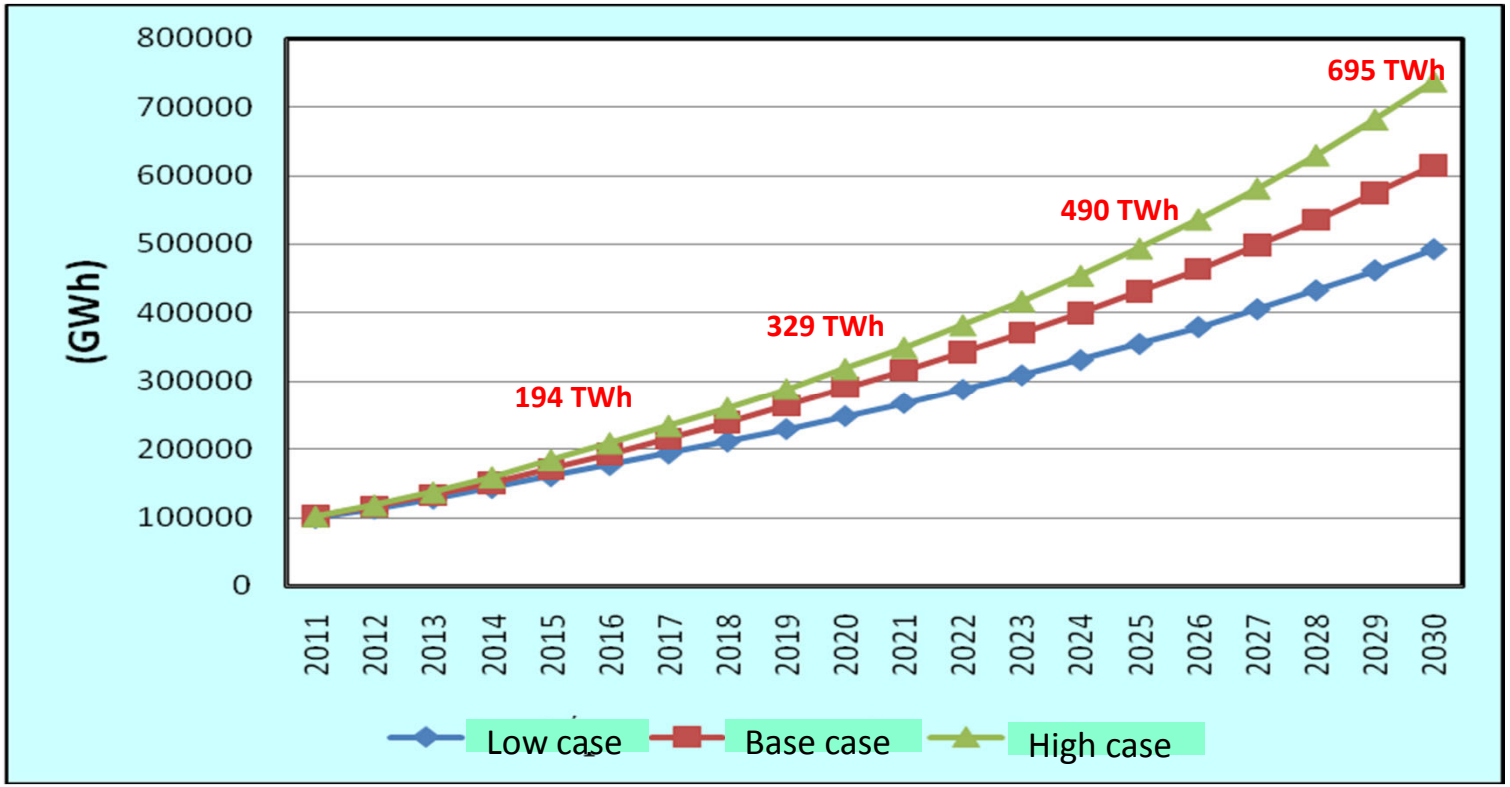
Outlook of VIE Power Sector (1/2)

- Robust demand growth projected at 10.5 – 7.5% (2016-2030) based on informal updated-PDP7
- Approx. half of generation investment expected to be private investment
- Large hydro site already developed except PSHPP
- Coal thermal to increase: 23% (2014) → 60% (2030)
- Depleting indigenous coal – coal import starting 2015/2016
- No clear strategy to introduce super-critical, USC
- High expectations for coal thermal BOTs but slow

Outlook of VIE Power Sector (2/2)

- Delayed gas development, but hopes for Blue Whale
- Modest RE target; slow EE implementation
- Nuclear delayed – legal/reg framework, human res.
- PSHPP planned – viewed in conjunction with nuclear
- Huge investment needs – priority for low upfront cost
- Smart grid road map (PM Decision 1670-QĐ/TTg) approved 8 Nov 2012:
  - 2013-'16: SCADA/EMS > 110 kV; Pilot AMI; Reg. Framework
  - 2017-'22: SCADA/DMS < 110 kV; AMI; Distributed Gen
  - 2023~: SCADA/DMS; AMI; Distributed Gen for Retail Market

Power Development Master Plan VII



Source: PDP7

Growth Rate	2006-2010	2011-2015	2016-2020	2021-2025	2026-2030
High case		16.0%	11.6%	9.2%	8.4%
Base case	14.0%	14.1%	11.3%	8.2%	7.4%

PDP7 (2011) being updated: Demand growth expected to be adjusted downwards based on slower GDP growth projection.

Power Development Master Plan VII

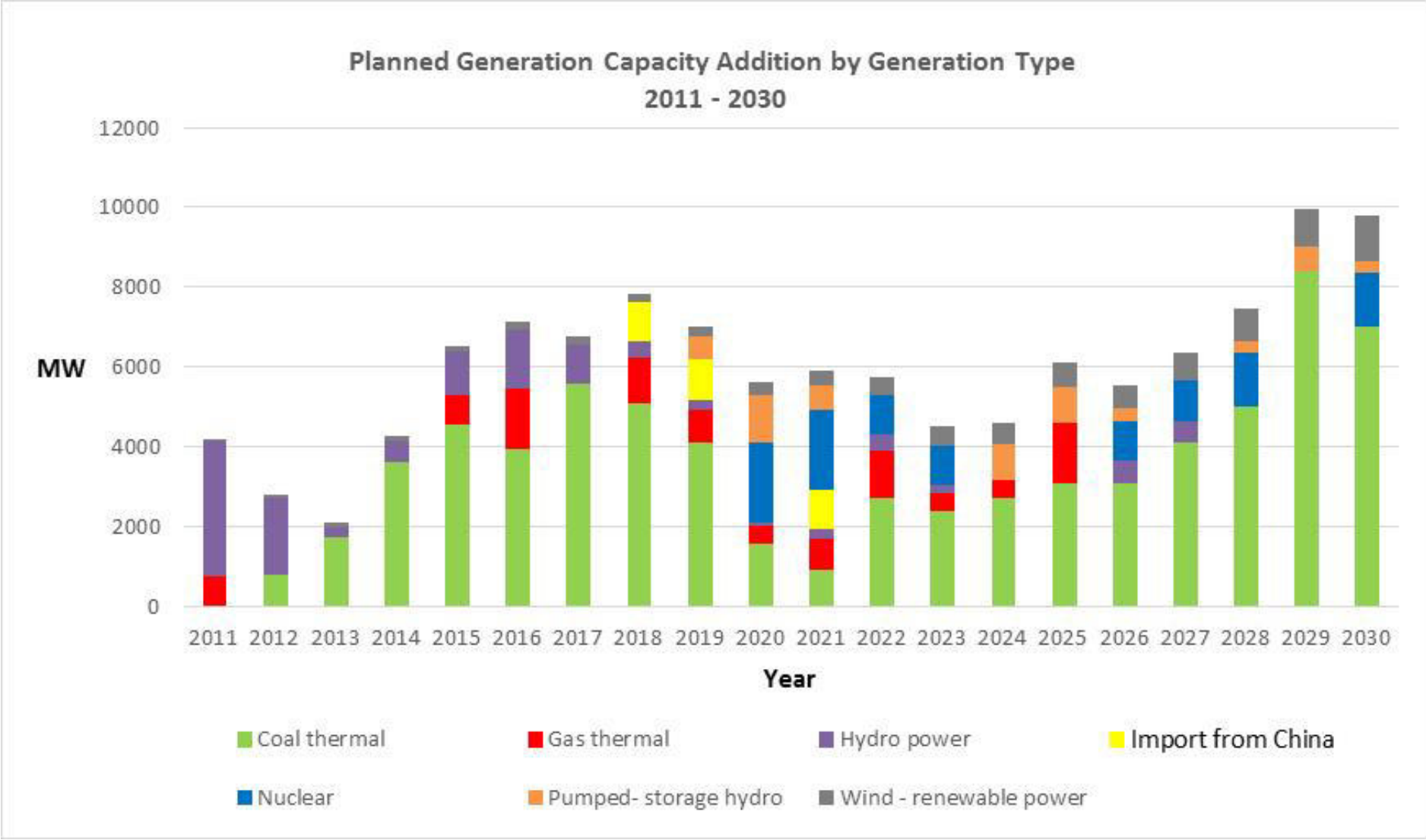
Capacity Addition for Period 2010 – 2030 (Base Case) Source: PDP7

	2010	2015	2020	2025	2030
Generation (GWh)	100,900	194,300	329,400	489,600	695,100
Peak Demand (MW)	16,048	30,803	52,040	77,084	110,215
Installed Cap. (MW)	19,937	**43,547**	**70,560**	101,195	146,395
Of which:					
Hydro PP & PSPP (MW/%)	7,726 38.8%	14,351 33.0%	17,455 24.7%	19,925 19.7%	21,125 14.4%
Oil & Gas TPP (MW/%)	7,703 38.6%	10,582 24.3%	13,625 17.3%	17,465 17.3%	17,465 11.9%
Coal TPP (MW/%)	3,231 16.2%	15,365 35.3%	32,385 45.9%	45,040 44.5%	77,160 **52.7%**
Import (MW/%)	750 3.8%	1,073 2.5%	1,839 2.6%	4,609 4.6%	6,359 4.3%
Renewable Energy (MW/%)	527 2.6%	2,176 5.0%	4,256 **6.0%**	8,156 8.1%	13,586 9.3%
Nuclear power (MW/%)	-	-	1,000 1.4%	6,000 5.9%	10,700 7.3%

34 GW today: Hydro 40%; Coal 28%.

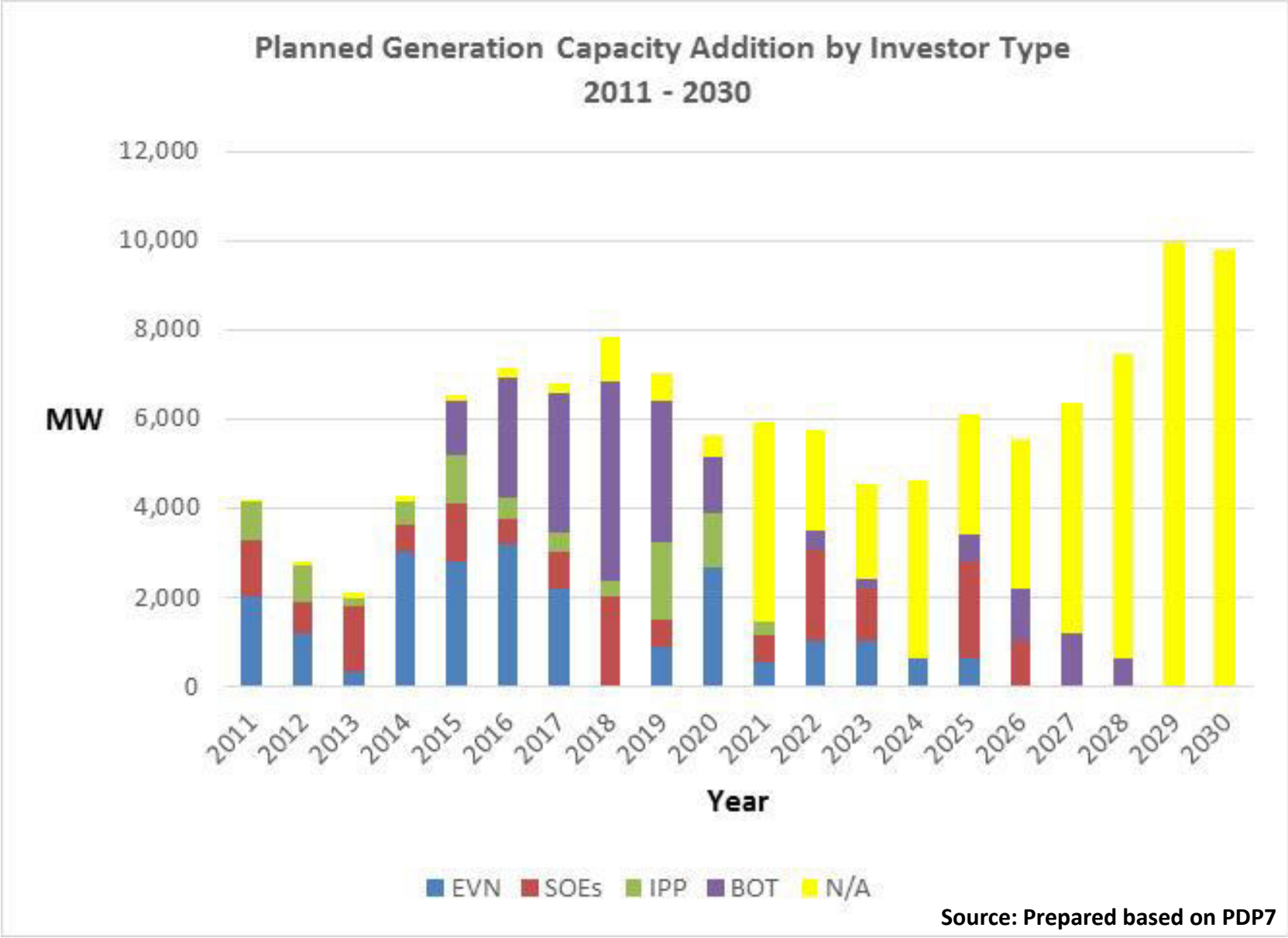
Peak demand expected to be adjusted to 62 MW in 2020.

Power Development Master Plan VII



Source: Prepared based on PDP7

Power Development Master Plan VII



Source: Prepared based on PDP7

Power Development Master Plan VII

Grid development – Additional Capacity

	2011-2015	2016-2020	2021-2025	2026-2030
500kV Substations (MVA)	17,100	26,750	24,400	20,400
220kV Substations (MVA)	35,863	39,063	42,775	53,250
500kV Trans. lines (Km)	3,833	4,539	2,234	2,724
220kV Trans. lines (Km)	10,637	5,305	5,552	5,020

Grid development plan is also being updated.

Source: PDP7

Power Development Master Plan VII

$ billion

	2011-2020	Per year	2021-2030	Per year	2011-2030	Per year
Whole system	**48.8**	**4.9**	**75.0**	**7.5**	**123.8**	**6.2**
Generation	32.5	3.3	49.1	4.9	81.6	4.1
Grid	16.3	1.6	25.9	2.6	42.2	2.1

Source: PDP7

Despite downward adjustment, investment in 2021-2030 still expected to be around $7 billion a year.

Renewable Energy

Sources	Status and Tariff Structure
Small hydro (< 30 MW)	• 1,670 MW developed • Avoided-cost tariff (average about US cent 5/kWh)
Wind Power	• 52 MW developed; 48 registered sites • FIT established (US cent 7.8/kWh – being revised)
Biomass	• 150 MW developed (mainly bagasse) • FIT US cent 5.8/kWh (cogen)
Waste to Energy	• 2.4 MW developed • FIT US cent 7.28/kWh (landfill), US cent 10.05 (incineration)
Solar	• Pilots (about 4 MW) developed. • FIT not established

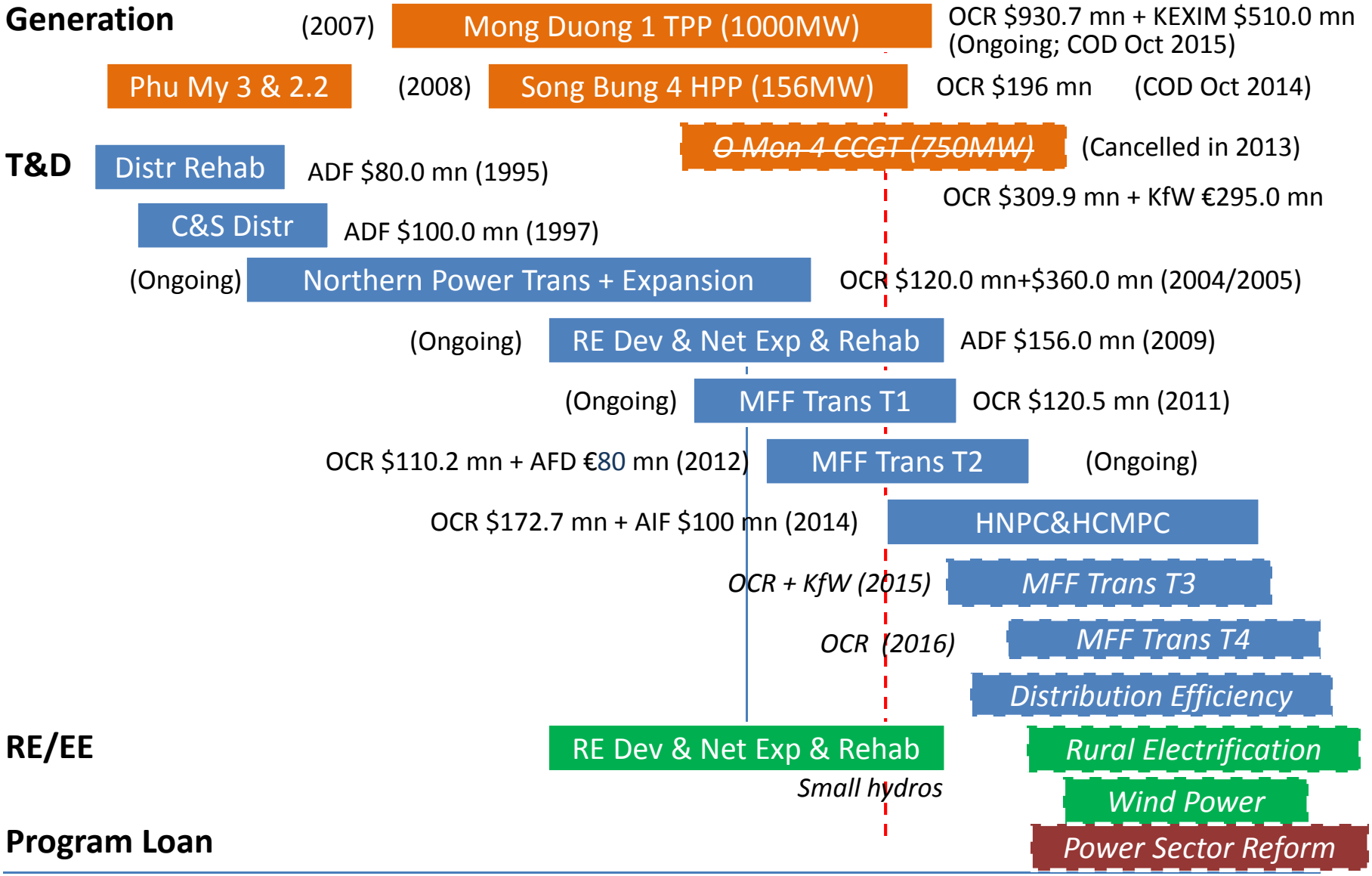
Source: GDE/MOIT

Slow, gradual development. No RE Law, no RE M/P.

FIT is a good start, but low.

Also, issue with EVN's off-take risk (for foreign investors).

ADB-funded Projects - Investments



Points of Discussion – Areas of Partnership

- What are the appropriate technologies applicable for countries like Viet Nam (e.g. high growth, low tariff)?
  - AMI, DAS/DMS, DSR, FACTS, HTLS conductors, amorphous transformers, RE, super critical/USC boilers…
- How can we advance from piloting to scaling-up and mainstreaming?
  - Awareness, policy, legal/reg framework, incentives, price/tariff signals, financial products…
- What do you (governments, utilities, technology providers) expect from ADB and how can we can partner up?

Thank you!

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