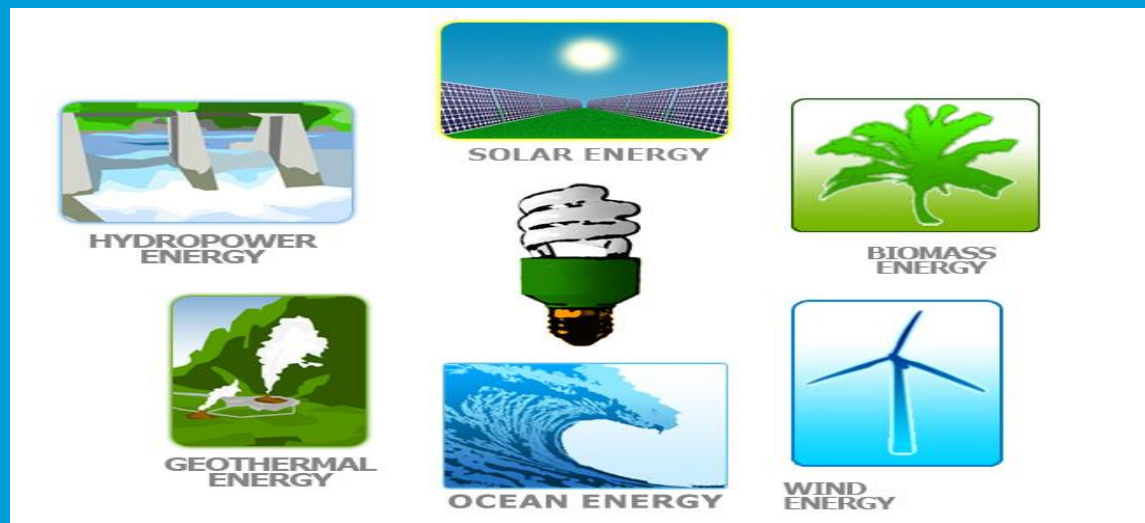


Vietnam Electricity



Renewable and Solar Schemes of Vietnam



Hanoi, October 2017

Trần Đăng Khoa-Power Market Department-EVN

Content

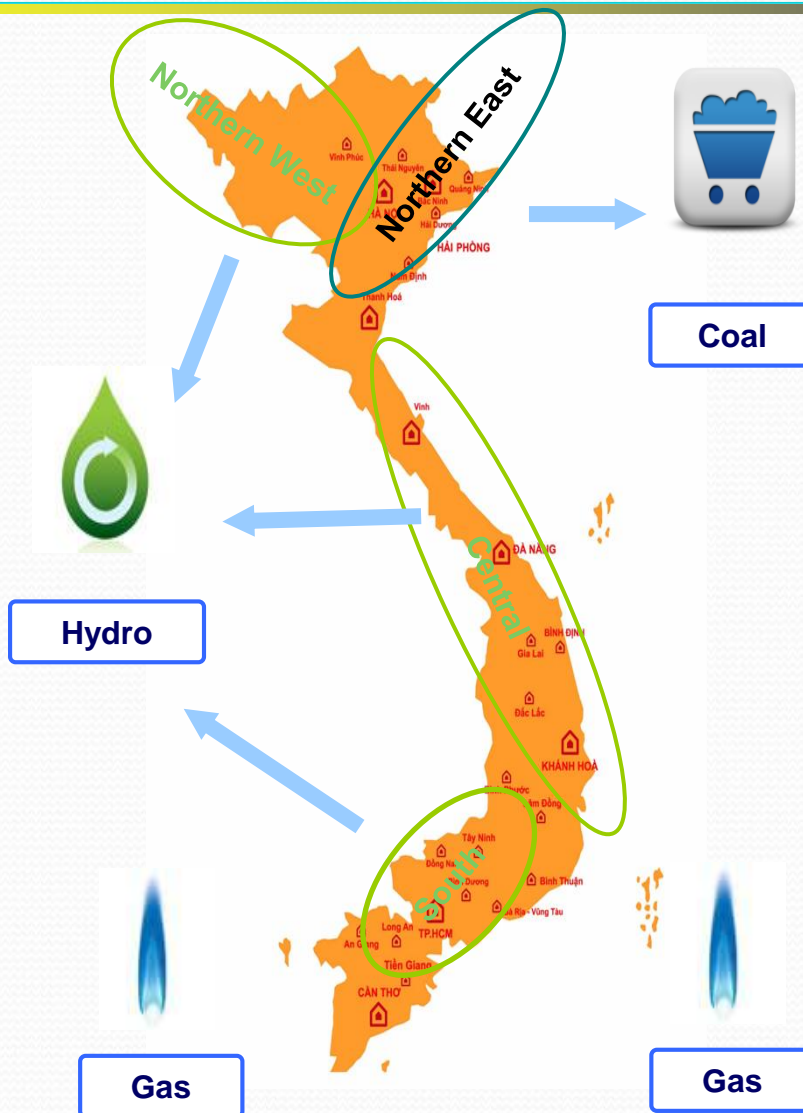


- I. Power system overview**
- II. Current Status of Renewable Energy**
- III. Solar Energy**

I. Power system overview

I. Generation portfolio over system overview

1. Primary fuel



I. Power system overview



2. Power system 2016



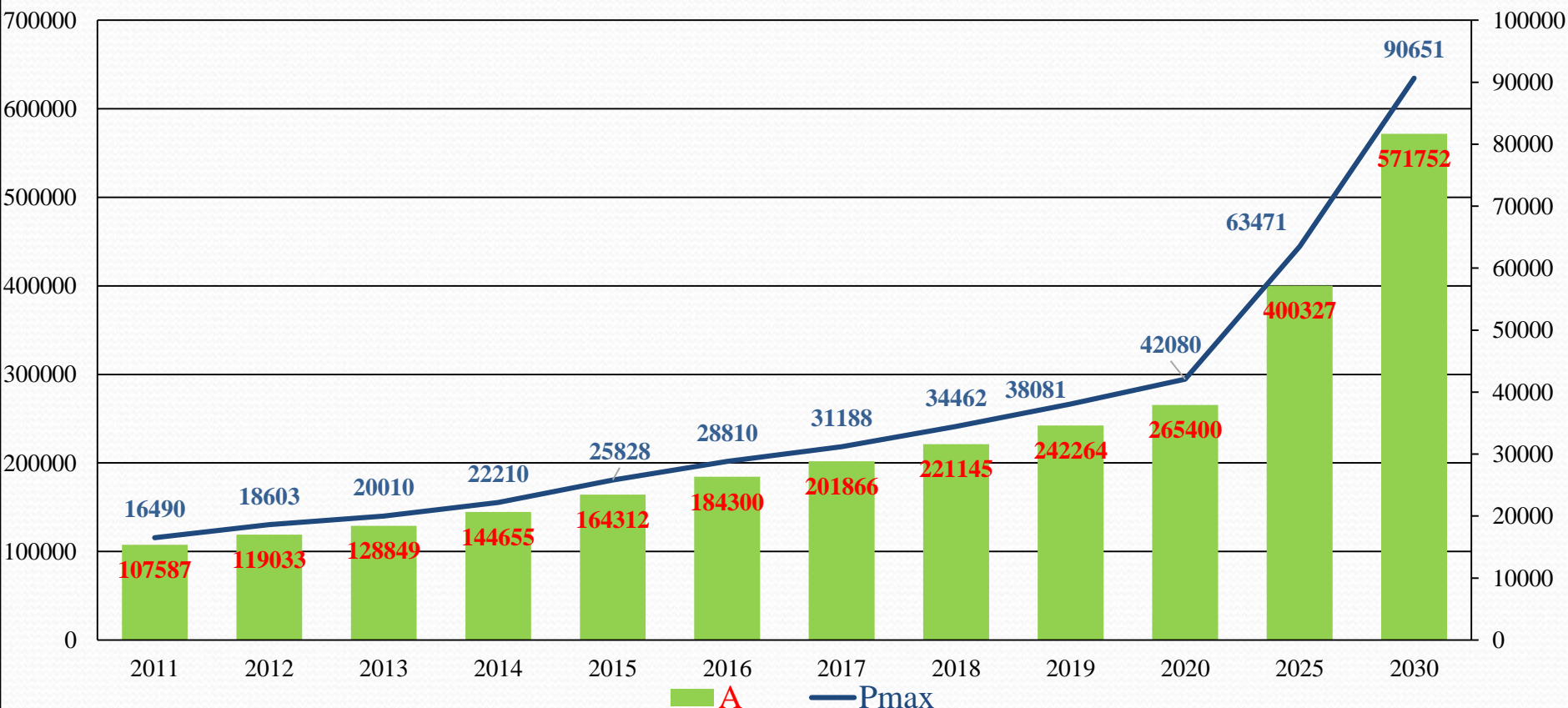
Generation Mix	Installed Capacity	Proportion (%)
Hydro	15986	38,3
Coal-fired	14447	34,6
Oil-fired	875	2,1
Gas (combined cycle)	7998	19,2
Wind	135	0,3
Biomass	54	0,1
Small hydro	2206,5	5,3
Total	41502	100

Contents	Unit	Quantity
500 kV transmission line	Km	7,444
200 kV transmission line	Km	16,551
110 kV distribution line	Km	20,215
Medium and low voltage line (2015)	Km	476,572
500 kV substation	MVA	26,100
220 kV substation	MVA	44,602
110 kV substation	MVA	50,813
Medium and low voltage substation (2015)	MVA	81,141

I. Power system overview



4. Load is forecasted for duration 2016-2030



Average growth rate (%)

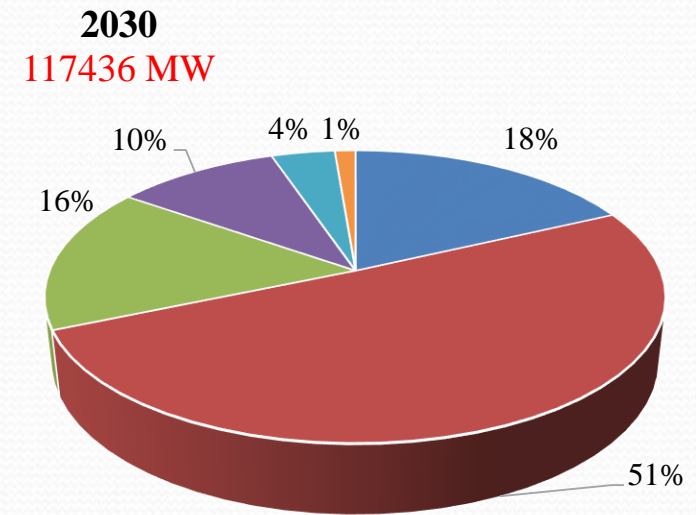
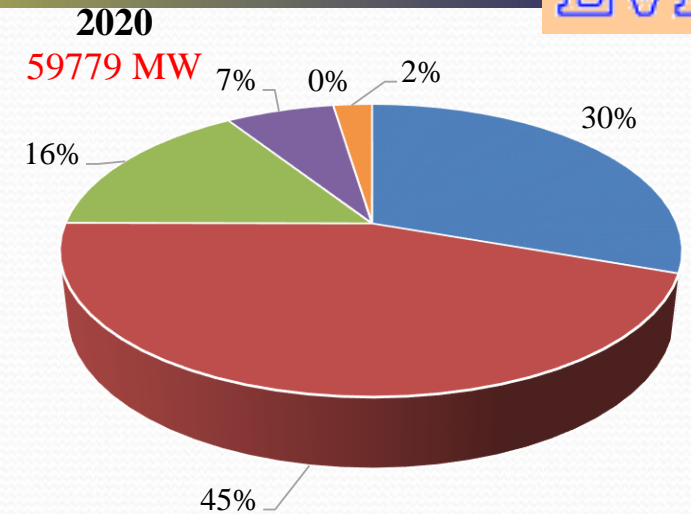
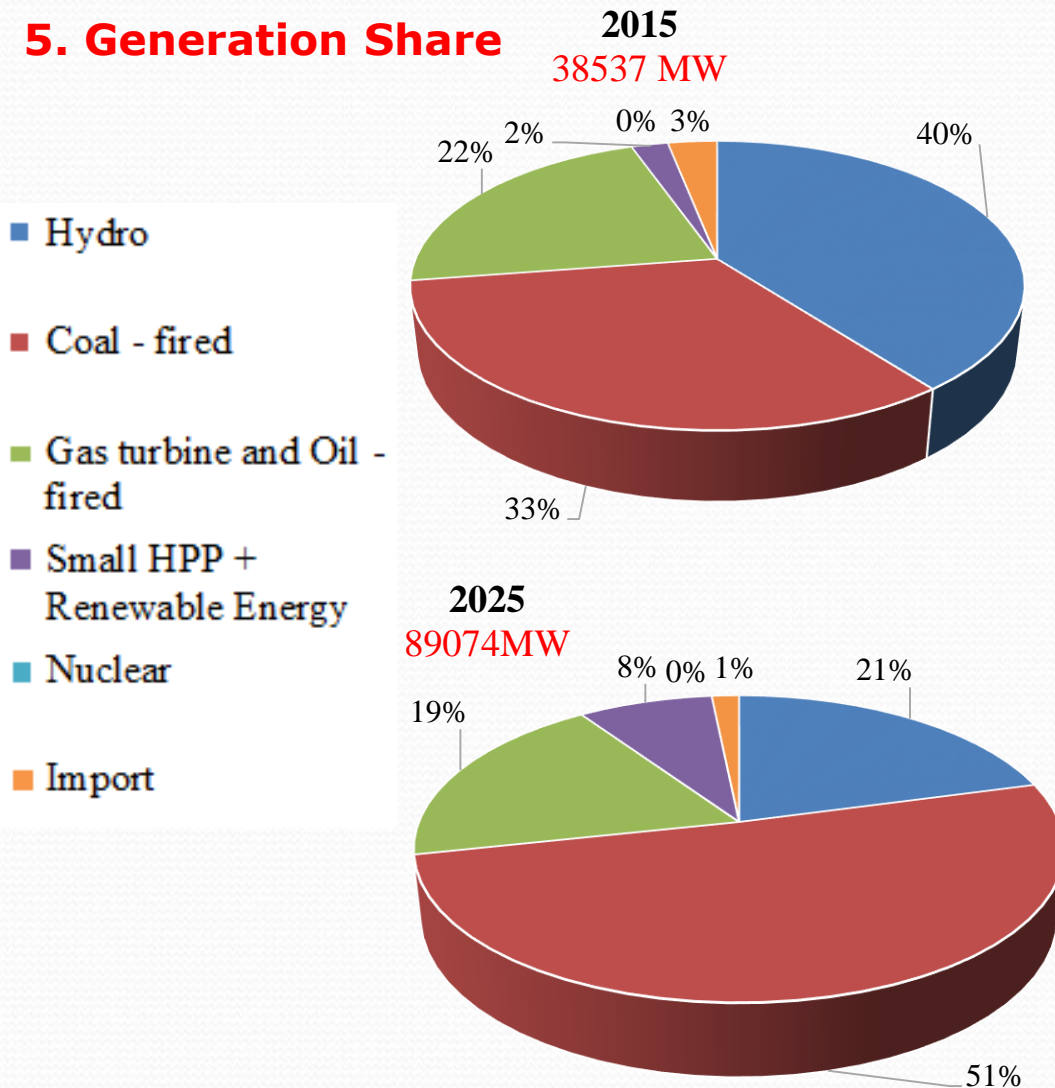
	2011-2015	2016-2020	2021-2025	2026-2030
Peak Load	11.9	10.5	8.6	7.4

Source: NLDC annual report, 2015 and Revised Master Plan VII.

I. Power system overview



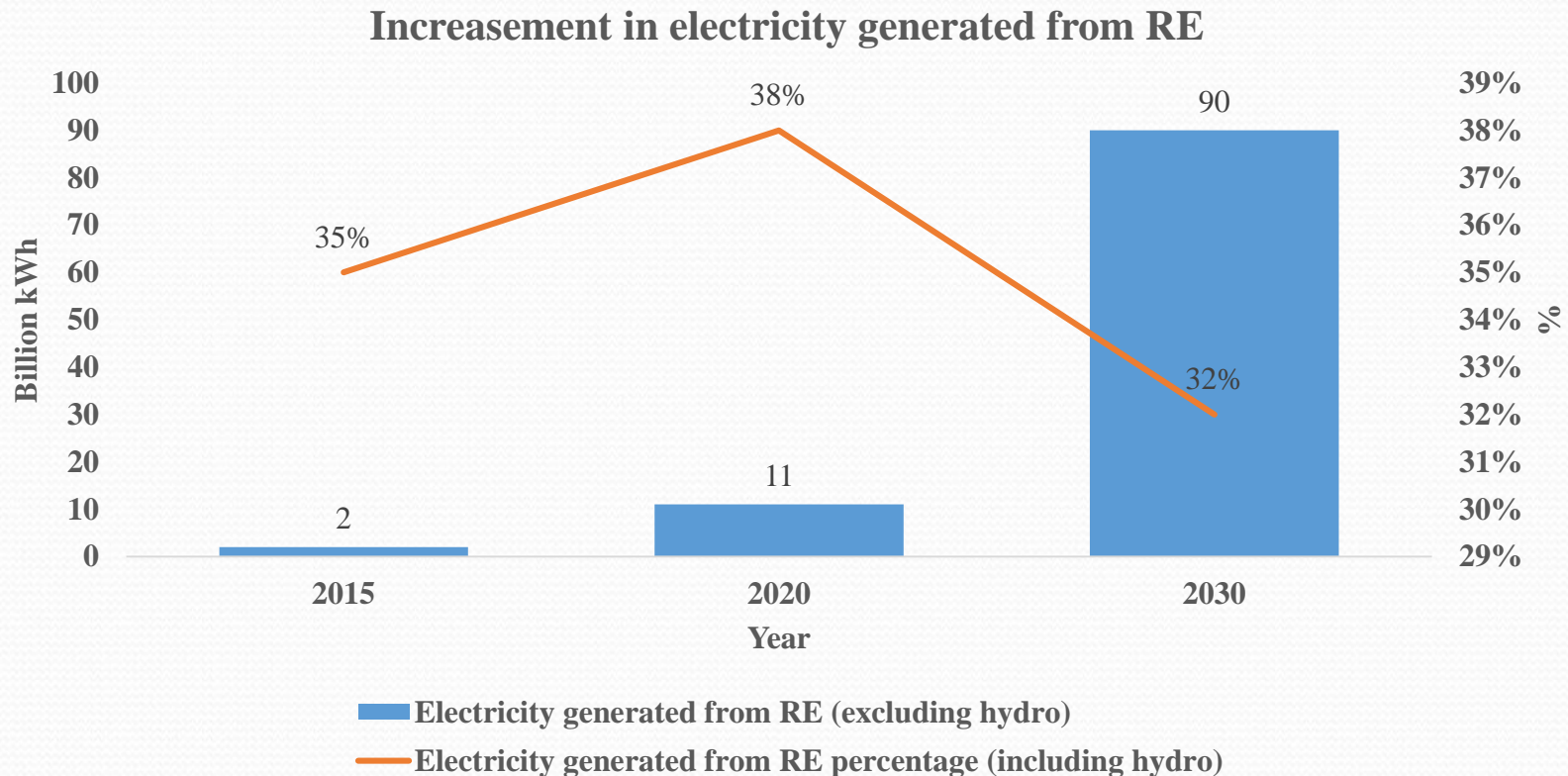
5. Generation Share



I. Power system overview

6. Government's strategic development plan

- Some major strategic targets (cont.):
 - To increase electricity generated from renewable energy:

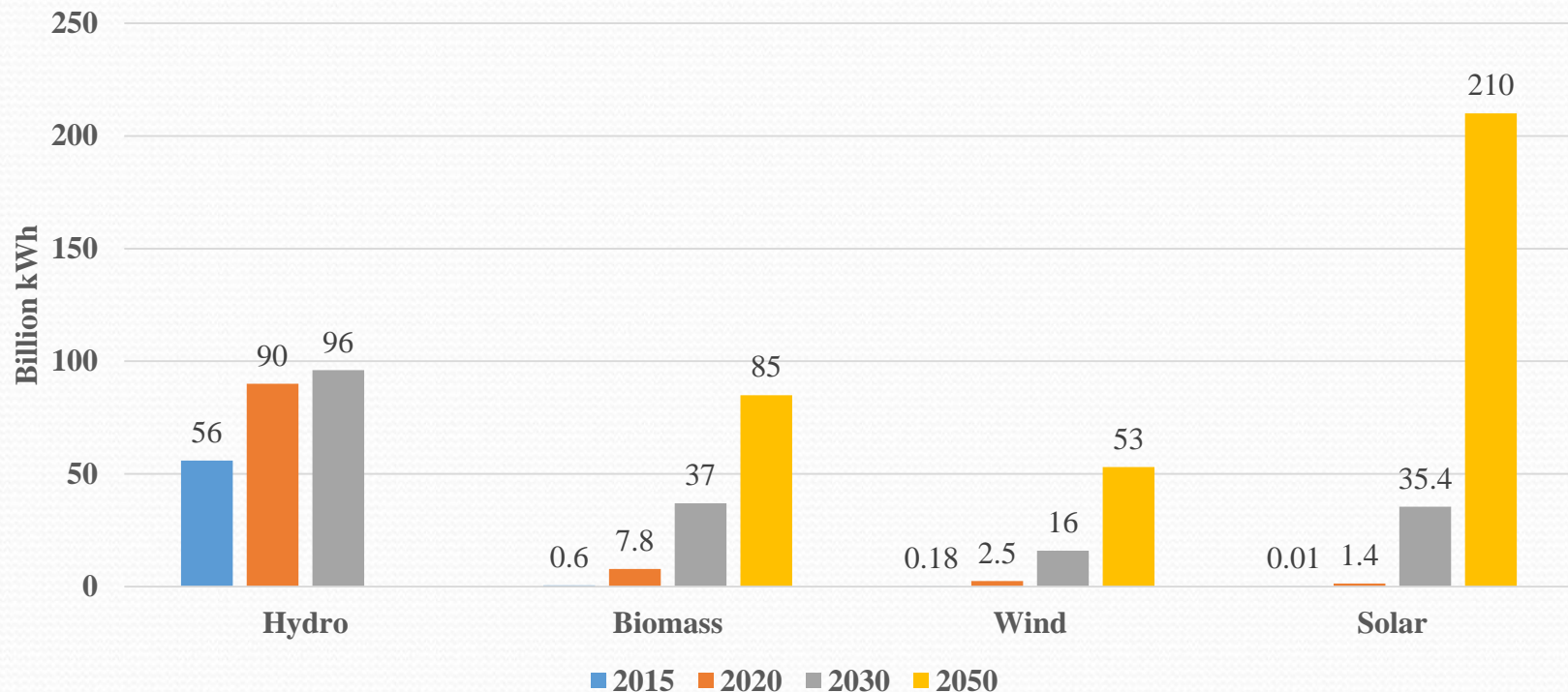


I. Power system overview

7. Government's strategic development plan (cont.)

- Some major strategic targets (cont.):
 - Oriented development for different types of RE from 2015 to 2050:

Oriented development for different types of RE



II. Current Status of Renewable Energy

II. Current Status of RE

1. Wind power

- Legal Rule: Decision 37/2011/QĐ-TTg dated 29/6/2011 issued by Prime Minister and Circular 32/2014/BCT issued by MOIT.
 - Electricity Tariff: 7,8 UScents/kWh and *planned to increase*.
 - PPA: Based on sample PPA.
- So far, there have been 9 projects signed PPA with EVN with total installed capacity of 403.9 MW and around 200MW in commercial operation.



II. Current Status of RE

2. Biomass

- Legal Rule: Decision 24/2014/QĐ-TTg dated 24/3/2014 issued by Prime Minister.
 - Electricity Tariff:
 - Electricity-thermal co-generation: 5,8 UScents/kWh.
 - The others: Based on avoided cost mechanism.
 - PPA: Based on sample PPA.
- According to statistics, there are 7 projects with total installed capacity of around 200 MW, almost in commercial operation.



II. Current Status of RE

3. Solid waste

- Legal Rule: Decision 31/2014/QĐ-TTg dated 05/05/2014 issued by Prime Minister.
 - Electricity Tariff:
 - Generated by burning solid waste directly: 10,05 UScents/kWh.
 - Generated by gas from solid waste landfill: 7,28 UScents/kWh.
 - PPA: Based on sample PPA.
 - Only two project signed PPA and one in commercial operation.



II. Current Status of RE

4. Small hydro

- Legal Rule: Decision 18/2008/QĐ-BCT dated 18/7/2008 and replaced by Circular 32/2014/TT-BCT dated 9/10/2014 issued by MOIT.
 - Electricity Tariff: Avoided cost issued by ERAV, 2016 tariff is around 5 Uscent/kWh.
 - PPA: Based on sample PPA.
 - Most successful mechanism: around 250 projects and 3000MW in commercial operation.



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II. Current Status of RE

5. Solar

- Legal Rule: Decision 11/2017/QĐ-TTg dated 11/04/2017 issued by Prime Minister.
 - Electricity Tariff:
 - 9,35 UScents/kWh for both solar farm and surplused roof top.
 - Affective until Jun 2019.
 - PPA: Based on sample PPA based on Circular 16/2017/TT-BCT dated 12/9/2017.



III. Solar Energy

III. Solar energy

1. Solar Radiation Study and Solar Potential in Vietnam regarding to information from MOIT

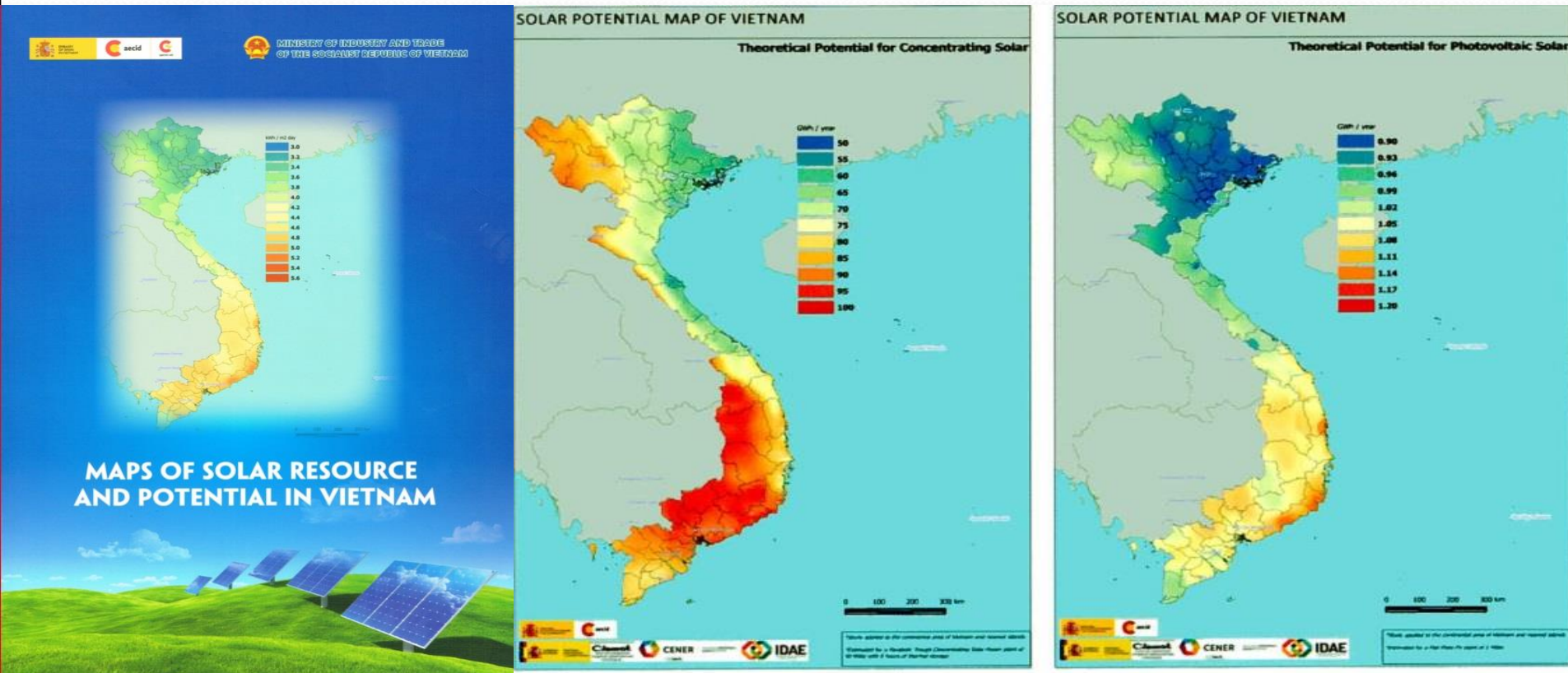


Fig. 7 Theoretical potential for CSP (left) and PV (right) in Vietnam

III. Solar energy



2. Solar Radiation Data in Vietnam

Areas	Sunshine Hours	Solar Radiation Intensity (kWh/m ² /day)	Remark
North East	1600 – 1750	3,3 – 4,1	Fair
North West	1750 – 1800	4,1 – 4,9	Fair
Middle North	1700 – 2000	4,6 – 5,2	Good
Central Highlands and South Central Region	2000 – 2600	4,9 – 5,7	Very good
South	2200 – 2500	4,3 – 4,9	Very good
Country on average	1700 – 2500	4,6	Good

Average total solar radiation is around 5 kWh/m²/day in the Central and the South, and 4 kWh/m²/day the North

III. Solar energy

3. Total capacity from renewable energy comes into operation:

Period	Capacity (MW)
2016 – 2020	3,603
2021 – 2025	6,290
2026 – 2030	15,190
Total (2016-2030)	25,083

Solar capacity

Year	Capacity (MW)
2020	850
2025	4,000
2030	12,000

III. Solar energy



4. Solar energy integration:

- (i) Solar master plan: Solar development have to comply with the revised master plant 7th, comply with the target of the government related to solar development plan.
- (ii) Grid code and Distribution code should be reviewed and revised as the case may be, in order to reflect of solar integration.
- (iii) System study should be implemented in order to optimize the auxiliary services with the more and more penetration ratio of solar and other intermitted energy.

Thank You!