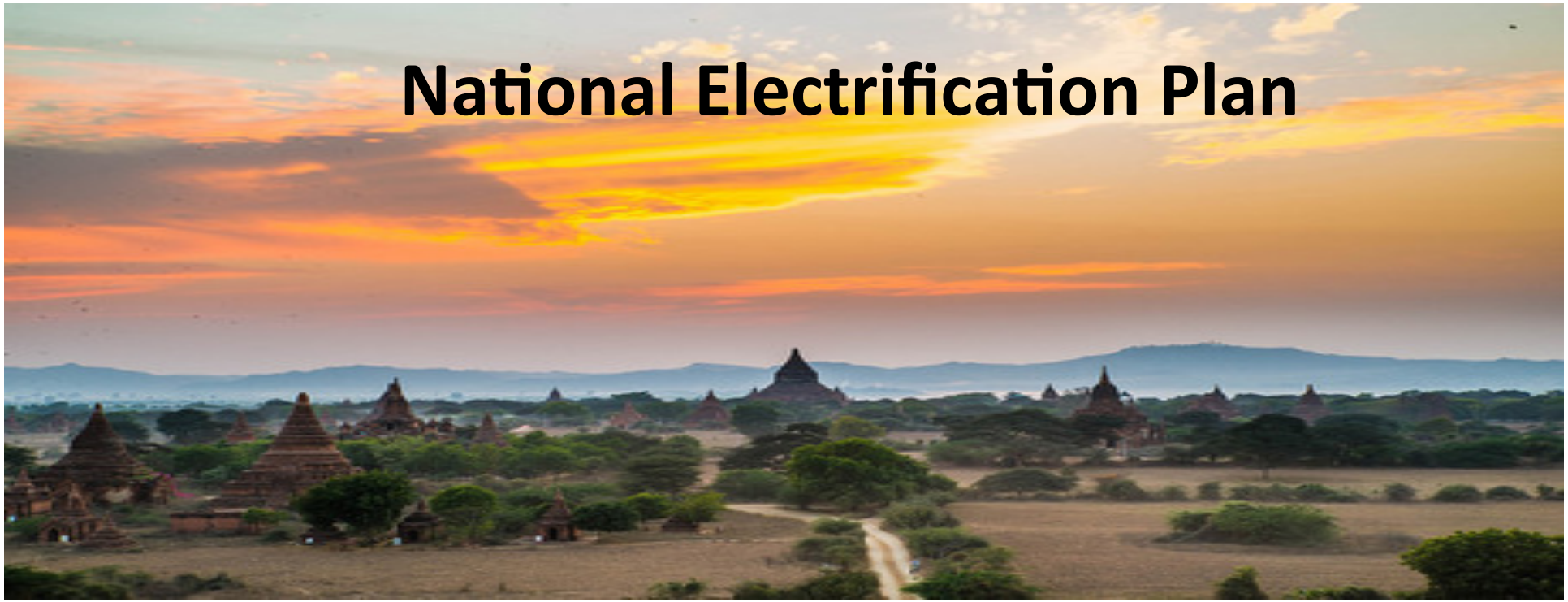
National Electrification Plan



Off-grid Rural Electrification

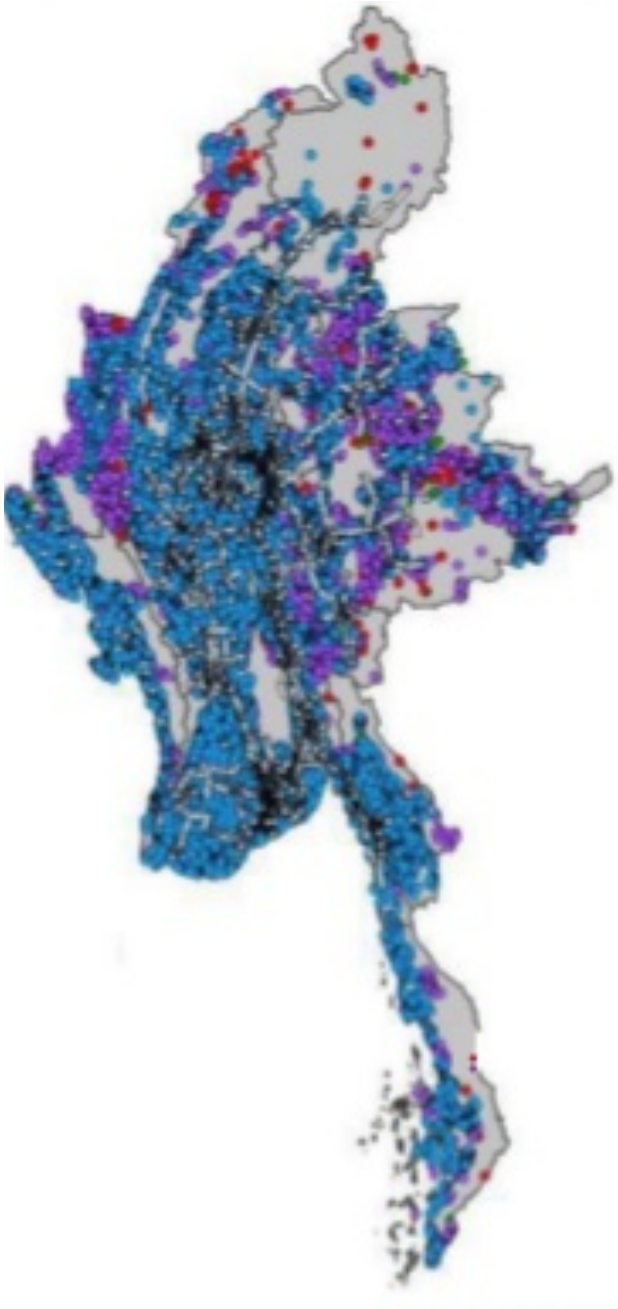
By

Department of Rural Development

OBJECTIVE

To Achieve Universal Access to Electricity in Myanmar by 2030

National Electrification Plan (2016-2021)



World Bank's International Development Association (IDA)

US$ (400) million

MOEP

- Grid-extension - US$ (300) million
  TA - US$ (10) million

MLFRD

- Off-grid Electrification US$ (80) million
  TA - US$ (10) million

Off-grid Electrification

- **Electrification System**
  - Solar Home System
  - Mini-Grid System (Solar, Hydro, Bio-mass and Bio-gas System)
- **Electrification Project**
  - Rural House-hold Electrification
  - Rural Street Light
  - Public Institutions (Schools, Rural Health Centre and Religious Building)

Technical Assistance by IDA (10) million

- Hiring Consultant
- Provide Technical Training for Implementation
- Selection of Electrical Systems and Technical Utilization Economical and Financing Assessment
- Management of Environmental and Social Impact
- Management of Procurement and Financing

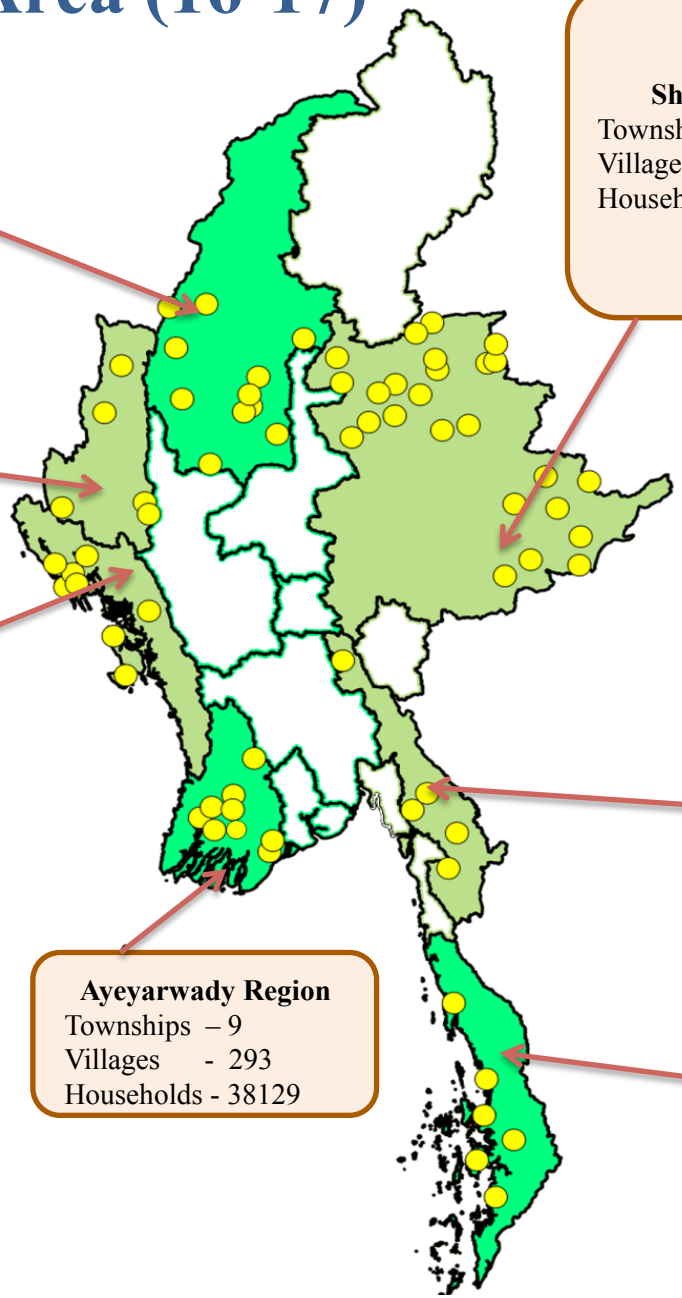
Project Area (16-17)

Sagaing Region
Townships - 11
Villages - 66
Households - 7680

Shan State
Townships - 25
Villages - 653
Households - 27167

Chin State
Townships - 5
Villages - 279
Households - 11542

Rakhaing State
Townships - 8
Villages - 219
Households - 30498



Kayin State
Townships - 5
Villages - 135
Households - 13753

Ayeyarwady Region
Townships – 9
Villages - 293
Households - 38129

Tanintharyi Region
Townships - 10
Villages - 149
Households - 18902

Remote communities areas located far beyond 11 miles from national grid and unlikely to receive electricity in next 10 years are targeted to pre-electrify.

National Electrification Project 2016-2017 Fiscal Year

No	State/ Region	Total Township	Total Villages	Unelectrified in the end of 2015-2016 FY			2016-2017 FY NEP Project						Unelectrified in the end of 2016-2017 FY			Remark
							MOEP (Phase 1)		NEP(DRD)							
									Solar Home System		Mini-grid System					
				Village	Village (%)	HHs	Village	HHs	Village	HHs	Village	HHs	Village	Village (%)	HHs	
1	Naypyitaw	8	796	358	45.0	67660	45	11047					313	39.3	56613	
2	Kachin	18	2582	726	28.1	35997	3	794					723	28.0	35203	
3	Kayah	7	511	47	9.2	1536	5	169					42	8.2	1367	
4	Kayin	7	2063	1522	73.8	112200	40	5162	135	13753			1347	65.3	93285	
5	Chin	9	1346	565	42.0	22289	4	173	279	11542	7	1627	275	20.4	8947	
6	Sagaing	37	6005	2650	44.1	343907	380	54784	66	7680			2204	36.7	281443	
7	Tanintharyi	10	1230	377	30.7	46520	26	6888	149	18902			202	16.4	20730	
8	Bago	28	6495	4841	74.5	572964	589	60835					4252	65.5	512129	
9	Magway	25	4795	2645	55.2	357613	269	40743					2376	49.6	316870	
10	Mandalay	28	4781	1668	34.9	275886	216	30874					1452	30.4	245012	
11	Mon	10	1150	483	42.0	67383	34	5380					449	39.0	62003	
12	Rakhine	17	3760	3064	81.5	407285	21	2523	219	30498			2824	75.1	374264	
13	Yangon	45	2129	1280	60.1	143020	84	10485					1196	56.2	132535	
14	Shan(East)	10	3304	2818	85.3	58323	22	1834	199	6899	7	608	2590	78.4	48982	
15	Shan(North)	24	6079	4694	77.2	157252	75	5426	454	20268			4165	68.5	131558	
16	Shan(South)	21	4965	3585	72.2	191862	117	9571					3468	69.8	182291	
17	Ayeyawady	26	11908	9899	83.1	939146	302	36744	293	38129			9304	78.1	864273	
	Total	**330**	**63899**	**41222**	**64.5**	**3800843**	**2232**	**283432**	**1794**	**147671**	**14**	**2235**	**37182**	**58.2**	**3367505**	

Specification

Components of the Solar System need to get the recommendation at least one of the following quality control organization-

- **Products with a valid PVGAP Quality Mark issued by IECEE**
- **Products accepted in the Bangladesh RERED Project.**
- **Products certified by Nepal's Renewable Energy Test Station (RETS).**
- **Winners and finalists in the Global LEAP awards.**
- **Products approved for use under the Lighting Global program.**

Technical Specification For DC Solar Home System (Small Package)					
No.	Parts Name	Item	Type	Quantity	Warranty Period
1	Minimum PV Array (Wp)	30Wp	Crystalline Silicon	1	10 years on PV modules (performance not less than 80% of name plate output)
2	Minimum Battery (Ah @ C20 x @ V)	12V/20Ah (50% DoD)	Lead acid battery	1	3 years warranty on Batteries to 80% of design capacity
		12V/12Ah (90% DoD)	Li-ion battery		
3	Minimum Charge controller	12V/2A	PWM	1	3 years on Charge Controller
4	DC LED Bulb	12V/3W	240 Lumens (±15%)	3	3 years minimum lifetime on any LED luminaires to 70% of initial lumen output
5	PV-Controller Wire	2.5mm^2 /8m	Tin Coated, Copper Wire.	1	3 years for all other PV system components, including any specific AC or DC appliances provided under the contract.
6	Controller-Battery Wire	2.5mm^2	Copper Wire.	1	
7	Load Wire	0.5mm^2 /8m	Copper Wire.	3	
8	USB Outlet	2A(at least)	-	1	
9	DC Socket Outlet	12V/2A(at least)	-	1	
10	PV Stand	Roof or Ground Mounted	Metal, Concrete or rot resistant wood pole	1	3 years
11	Service Level	3.5hr (for lights) 2.5hr (for cell-phone charging) 1.2hr (for 15W DC TV)			

Technical Specification For DC Solar Home System (Medium Package)					
No.	Parts Name	Item	Type	Quantity	Warranty Period
1	Minimum PV Array (Wp)	45Wp	Crystalline Silicon	1	10 years on PV modules (performance not less than 80% of name plate output)
2	Minimum Battery (Ah @ C20 x @ V)	12V/30Ah (50% DoD)	Lead acid battery	1	3 years warranty on Batteries to 80% of design capacity
		12V/16Ah (90% DoD)	Li-ion battery		
3	Minimum Charge controller	12V/3A	PWM	1	3 years on Charge Controller
4	DC LED Bulb	12V/3W	240 Lumens (±15%)	4	3 years minimum lifetime on any LED luminaires to 70% of initial lumen output
5	PV-Controller Wire	2.5mm^2 /8m	Tin Coated, Copper Wire.	1	3 years for all other PV system components, including any specific AC or DC appliances provided under the contract.
6	Controller-Battery Wire	2.5mm^2	Copper Wire.	1	
7	Load Wire	0.5mm^2 /8m	Copper Wire.	4	
8	USB Outlet	2A(at least)	-	1	
9	DC Socket Outlet	12V/2A(at least)	-	1	
10	PV Stand	Roof or Ground Mounted	Metal, Concrete or rot resistant wood pole	1	3 years
11	Service Level	4 hr (for lights) 2.5hr (for cell-phone charging) 1.8hr (for 15W DC TV)			

Technical Specification For DC Solar Home System (Large Package)					
No.	Parts Name	Item	Type	Quantity	Warranty Period
1	Minimum PV Array (Wp)	60Wp	Crystalline Silicon	1	10 years on PV modules (performance not less than 80% of name plate output)
2	Minimum Battery (Ah @ C20 x @ V)	12V/40Ah (50% DoD)	Lead acid battery	1	3 years warranty on Batteries to 80% of design capacity
		12V/23Ah (90% DoD)	Li-ion battery		
3	Minimum Charge controller	12V/5A	PWM	1	3 years on Charge Controller
4	DC LED Bulb	12V/3W	>240 Lumens (±15%)	5	3 years minimum lifetime on any LED luminaires to 70% of initial lumen output
5	PV-Controller Wire	2.5mm^2 /8m	Tin Coated, Copper Wire.	1	3 years for all other PV system components, including any specific AC or DC appliances provided under the contract.
6	Controller-Battery Wire	2.5mm^2	Copper Wire.	1	
7	Load Wire	0.5mm^2 /8m	Copper Wire.	4	
8	USB Outlet	2A(at least)		1	
9	DC Socket Outlet	12V/2A(at least)		1	
10	PV Stand	Roof or Ground Mounted	Metal, Concrete or rot resistant wood pole	1	3 years
11	Service Level	5 hr (for lights) 2.5hr (for cell-phone charging) 3hr (for 15W DC TV)			

Technical Specification For Primary School (AC Type)					
No.	Parts Name	Item		Quantity	Warranty Period
1	Minimum power of solar PV array	120Wp	Crystalline Silicon	1	25 years on PV modules (performance not less than 80% of name plate output)
2	Minimum Battery storage capacity	24V/30Ah (75% DoD)	Lead Acid (immobilized electrolyte)	1	3 years warranty on Batteries to 80% of design capacity
3	Minimum Solar Charge Controller	24V/6A	PWM type	1	5 years on Charge Controller
4	Minimum Inverter	100VA	sine wave inverter	1	5 years warranty on Inverter
5	AC interior LED	9W (230V,50Hz)	720 Lumens (±15%) (strip luminaries)	8	5 years minimum lifetime on any LED luminaires to 70% of initial lumen output
6	AC exterior LED	7W (230V,50Hz)	550 Lumens (±15%) (bulkhead luminaire)	1	
7	PV module interconnection	> 2.5mm^2 XSA conductor	Flexible multi-strand copper single conductor		3 years for all other PV system components, including any specific AC or DC appliances provided under the contract.
8	PV-Controller Wire	> 4mm^2 XSA conductor	Flexible multi-strand copper conductor		
9	Controller-Battery Wire	> 4mm^2 XSA conductor	Flexible multi-strand bunched copper single conductor		
10	Battery-Inverter Wire	> 6mm^2 XSA conductor	Cables heat-shrink at both ends, and lugged		
11	PV Rack	Roof or Ground Mounted	Galvanized or Stainless steel		3 Years

Technical Specification For Middle School (AC Type)					
No.	Parts Name	Item		Quantity	Warranty Period
1	Minimum power of solar PV array	375 Wp	Crystalline Silicon	1	25 years on PV modules (performance not less than 80% of name plate output)
2	Minimum Battery storage capacity	24V/95Ah (75% DoD)	Tubular	1	3 years warranty on Batteries to 80% of design capacity
3	Minimum Solar Charge Controller	24V/20A	PWM type	1	5 years on Charge Controller
4	Minimum Inverter	306VA	sine wave inverter	1	5 years warranty on Inverter
5	AC interior LED	9W (230V,50Hz)	720 Lumens (±15%) (strip luminaries)	18	5 years minimum lifetime on any LED luminaires to 70% of initial lumen output
6	AC exterior LED	7W (230V,50Hz)	550 Lumens (±15%) (bulkhead luminaire)	2	
7	PV module interconnection	> 2.5mm^2 XSA conductor	Flexible multi-strand copper single conductor		3 years for all other PV system components, including any specific AC or DC appliances provided under the contract.
8	PV-Controller Wire	> 4mm^2 XSA conductor	Flexible multi-strand copper conductor		
9	Controller-Battery Wire	> 4mm^2 XSA conductor	Flexible multi-strand bunched copper single conductor		
10	Battery-Inverter Wire	> 6mm^2 XSA conductor	Cables heat-shrink at both ends, and lugged		
11	PV Rack	Roof or Ground Mounted	Galvanized or Stainless steel		3 Years

Technical Specification For High School (AC Type)					
No.	Parts Name	Item		Quantity	Warranty Period
1	Minimum power of solar PV array	475 Wp	Crystalline Silicon	1	25 years on PV modules (performance not less than 80% of name plate output)
2	Minimum Battery storage capacity	24V/120Ah (75% DoD)	Tubular	1	3 years warranty on Batteries to 80% of design capacity
3	Minimum Solar Charge Controller	24V/25A	PWM type	1	5 years on Charge Controller
4	Minimum Inverter	408VA	sine wave inverter	1	5 years warranty on Inverter
5	AC interior LED	9W (230V,50Hz)	720 Lumens (±15%) (strip luminaries)	24	5 years minimum lifetime on any LED luminaires to 70% of initial lumen output
6	AC exterior LED	7W (230V,50Hz)	550 Lumens (±15%) (bulkhead luminaire)	2	
7	PV module interconnection	> 2.5mm^2 XSA conductor	Flexible multi-strand copper single conductor		3 years for all other PV system components, including any specific AC or DC appliances provided under the contract.
8	PV-Controller Wire	> 4mm^2 XSA conductor	Flexible multi-strand copper conductor		
9	Controller-Battery Wire	> 4mm^2 XSA conductor	Flexible multi-strand bunched copper single conductor		
10	Battery-Inverter Wire	> 6mm^2 XSA conductor	Cables heat-shrink at both ends, and lugged		
11	PV Rack	Roof or Ground Mounted	Galvanized or Stainless steel		3 Years

Technical Specification For Rural health centre (H-RHC) (AC Type)					
No.	Parts Name	Item		Quantity	Warranty Period
1	Minimum power of solar PV array	180 Wp	Crystalline Silicon	1	25 years on PV modules (performance not less than 80% of name plate output)
2	Minimum Battery storage capacity	24V/45Ah (75% DoD)	Tubular	1	3 years warranty on Batteries to 80% of design capacity
3	Solar Charge Controller	24V/9A	PWM type	1	5 years on Charge Controller
4	Inverter	150VA	sine wave inverter	1	5 years warranty on Inverter
5	AC interior LED	9W (230V,50Hz)	720 Lumens (±15%) (strip luminaries)	5	5 years minimum lifetime on any LED luminaires to 70% of initial lumen output
6	AC exterior LED	7W (230V,50Hz)	550 Lumens (±15%) (bulkhead luminaire)	1	
7	PV module interconnection	> 2.5mm^2 XSA conductor	Flexible multi-strand copper single conductor		3 years for all other PV system components, including any specific AC or DC appliances provided under the contract.
8	PV-Controller Wire	> 4mm^2 XSA conductor	Flexible multi-strand copper conductor		
9	Controller-Battery Wire	> 4mm^2 XSA conductor	Flexible multi-strand bunched copper single conductor		
10	Battery-Inverter Wire	> 6mm^2 XSA conductor	Cables heat-shrink at both ends, and lugged		
11	PV Rack	Roof or Ground Mounted	Galvanized or Stainless steel		3 Years

Technical Specification For Religious building (RA-RB) (AC Type)					
No.	Parts Name	Item		Quantity	Warranty Period
1	Minimum power of solar PV array	120Wp	Crystalline Silicon	1	25 years on PV modules (performance not less than 80% of name plate output)
2	Minimum Battery storage capacity	24V/30Ah (75% DoD)	Tubular	1	3 years warranty on Batteries to 80% of design capacity
3	Solar Charge Controller	24V/6A	PWM type	1	5 years on Charge Controller
4	Inverter	100VA	sine wave inverter	1	5 years warranty on Inverter
5	AC interior LED	9W (230V,50Hz)	720 Lumens (±15%) (strip luminaries)	6	5 years minimum lifetime on any LED luminaires to 70% of initial lumen output
6	AC exterior LED	7W (230V,50Hz)	550 Lumens (±15%) (bulkhead luminaire)	3	
7	PV module interconnection	> 2.5mm^2 XSA conductor	Flexible multi-strand bunched copper single conductor		3 years for all other PV system components, including any specific AC or DC appliances provided under the contract.
8	PV-Controller Wire	> 4mm^2 XSA conductor	Flexible multi-strand copper conductor		
9	Controller-Battery Wire	> 4mm^2 XSA conductor	Flexible multi-strand bunched copper single conductor		
10	Battery-Inverter Wire	> 6mm^2 XSA conductor	Cables heat-shrink at both ends, and lugged		
10	PV Rack	Roof or Ground Mounted	Galvanized or Stainless steel		3 Years

Technical Specification For Streetlight					
No.	Parts Name	Item	Type	Quantity	Warranty Period
1	Minimum PV Module (Wp)	70Wp	Crystalline Silicon	1	25 years on PV module(performance not less than 80% of name plate output)
2	Minimum Battery (Ah@C20x@V)	12V/26Ah (90% DoD)	Li-ion battery	1	at least 1500 charge-discharge cycles or 4 years
3	Minimum Charge controller	12V/6A	PWM	1	5 years on Charge Controller
4	DC LED Bulb	12V/10W	>1000 Lumens (±15%)	1	25000 hourlife to 70% of initial lumen output
5	PV-Controller Wire	2.5 mm^2	flexible multi-strand copper conductor	1	3 years for all other PV system components, including any specific AC or DC appliances provided under the contract.
6	Controller-Battery Wire	2.5mm^2	Copper Wire	1	
7	Controller-DC lamp	1.5mm^2	Copper Wire	1	
8	PV Stand	Pole mounted standalone streetlight	Concrete or wooden pole	1	3 years
9	Service Level	providing lighting for 12 hours per day			

Supply and Installation of Goods

Description

- ICB for Solar PV Systems for households, public institutions and street lights for 7 States/ Regions – Kayin, Chin, Sagaing, Tanintharyi, Rakhine, Shan and Ayeyawaddy (total 12 lots in one ICB)
- ICB for Mini-Grid System

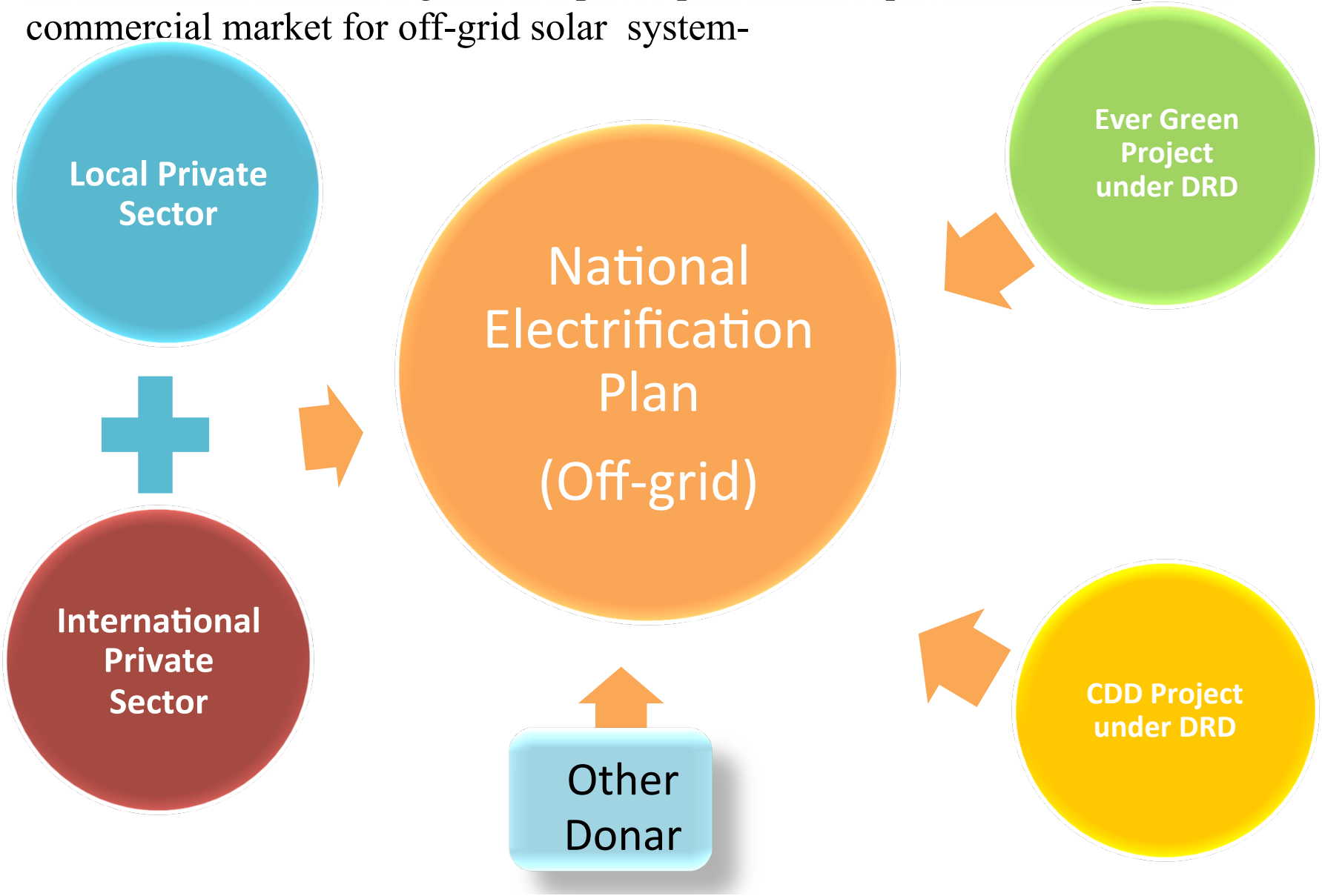
Schedule

- Advertisement and Issue Bidding Document – February 2016 (tentative)
- Tender Closing – April 2016 (tentative)

- Advertise and Issue BD -October 2016 (tentative)
- Tender Closing – December 2016 (tentative)

Multi -Sector Participation in Off-Grid Electrification

Under NEP, the following sectors' participation are required to develop the commercial market for off-grid solar system-



Thank You