Preparedness of Gujarat for Offshore Wind Energy Deployment

By:

Energy and Petrochemicals Department

Government of Gujarat

24th July 2018

Outline

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Government of Gujarat
Energy & Petrochemicals Department

- **ADVANTAGE GUJARAT**
- **RPO TRAJECTORY**
- **OFFSHORE – POTENTIAL STATUS & ZONES**
- **EPD – FRONT CO-ORDINATOR**
- **ROLES & RESPONSIBILITY**
  - **GETCO**
  - **GMB**
  - **GPPL**

Advantage Gujarat

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- One of the most industrialized states of India.
- Longest coastline of India: 1,600 km
  - 42 Minor Ports, 1 Major Port
  - 3 Ports – All time Weather Ports
- Robust Power Evacuation
  - 61000 CKT KM
  - 1869 Substations
  - 110 Giga VA Capacity
- Among highest RE penetration (27.6%) *
  - Wind 5607.35 MW
  - Solar 1681.85 MW
  - Biomass 41.2 MW
  - Mini Hydro 9.6 MW
  - TOTAL 7340 MW

Offshore wind Potential : 32 -35 GW

GUVNL RPO Trajectory

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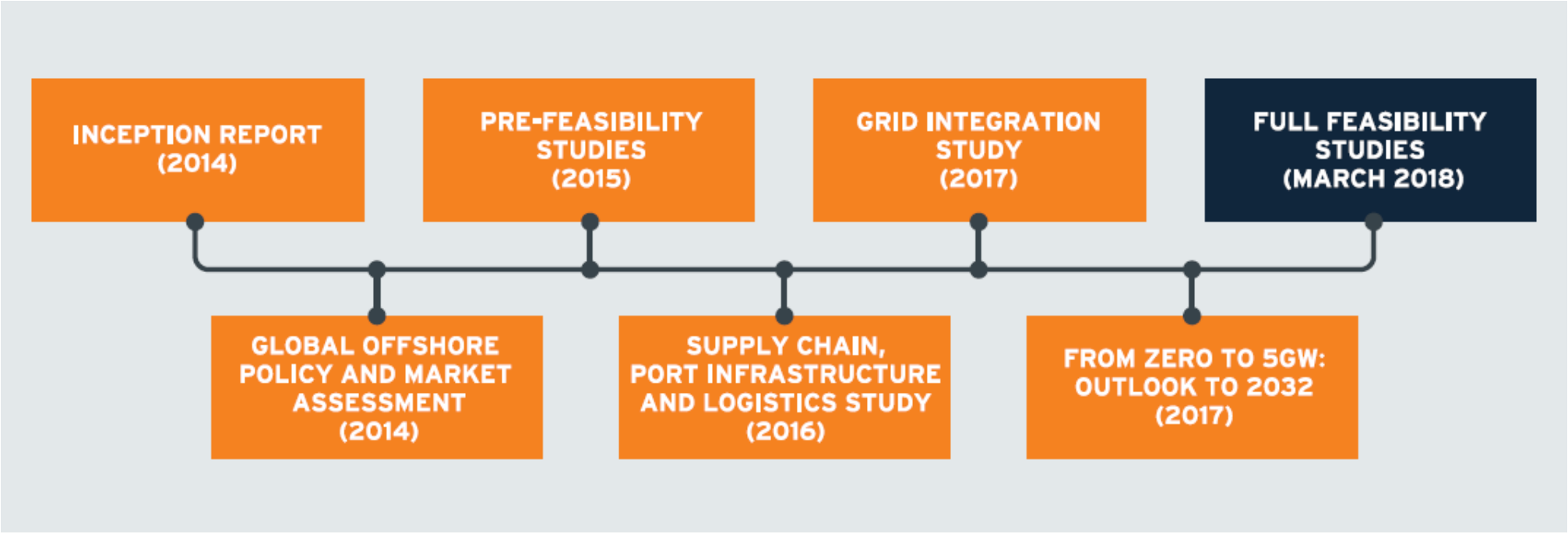
	RPO OBLIGATION (%AGE OF TOTAL ANNUAL ENERGY PURCHASE)			
Year	**Wind**	Solar	Other	Total
2016-17	**7.75**	1.75	0.5	10.0
2017-18	**7.75**	1.75	0.5	10.0
2018-19	**7.95**	4.25	0.50	12.70
2019-20	**8.05**	5.50	0.75	14.30
2020-21	**8.15**	6.75	0.75	15.65
2021-22	**8.25**	8.00	0.75	17.00

Scope of FOWIND Studies for Gujarat

- Via tri-partite agreement dated 1 Feb. 2014:
  1. Global Wind Energy Council (GWEC)
  2. World Institute of Sustainable Energy (WISE)
  3. Gujarat Power Corporation Limited (GPCL)
- LIDAR Support from MNRE
  - Conducted by NIWE



FOWIND's Identified Potential

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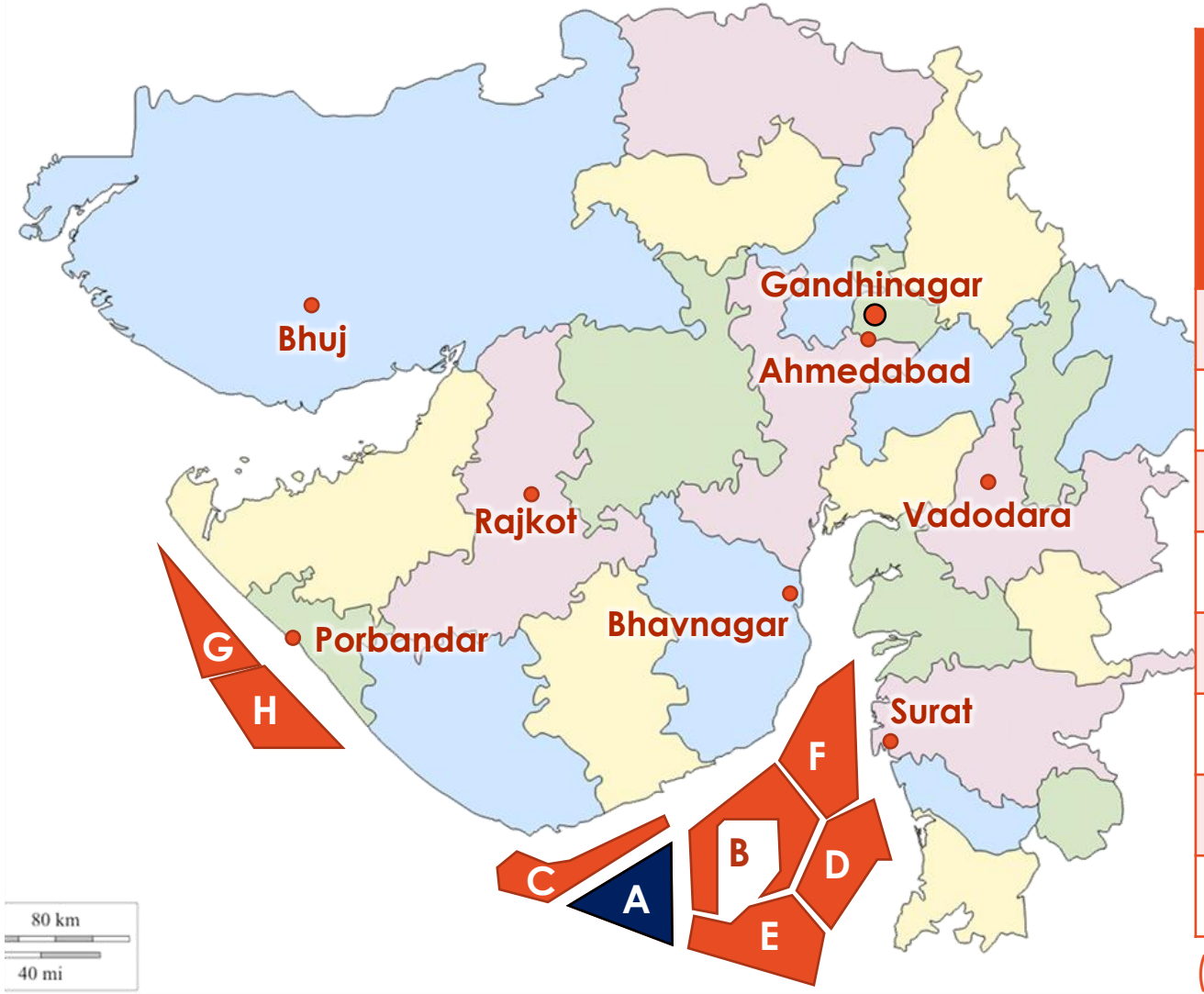

Zone	Mean Wind Speed @ 120 m AGL[1] (m/s)	Depth (m LAT[2])	Minimum Distance from S/S (km)	Area (km²)
A	**7.0**	**-24**	**23**	**1,921**
B	7.0	-17	26	2,924
C	6.9	-28	9	1,414
D	6.8	-22	15	2,547
E	6.9	-26	45	2,503
F	6.8	-15	9	2,519
G	6.8	-42	13	1,624
H	6.8	-43	16	2,254

(1) AGL: Above Ground Level (2) Lowest Astronomical Tide

Govt. Of Gujarat – Basic Roles & Responsibility

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- **To decide Planning of Offshore Wind Mill project within coastal area of Gujarat upto 2022**
- **To decide Power Procurement in consultation with MNRE GoI**
- **To provide Onshore power evacuation facility, if entire power to be procured by Gujarat OR**
- **Facilitate CTU to setup Onshore substation near to Coastal area in proximity to project**
- **Facilitate to State level Clearances eg CZMA, Port, fisheries etc) & other requisite Statutory & Non Statutory Clearances**
- **Provide support by giving dedicated jetty or port. OR**
- **By providing existing port with suitable facilities for offshore windmill project.**

Govt. Of Gujarat- Agencies involve in Offshore wind

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Energy & Petrochemicals Department

- **Energy & Petrochemical Department - Overall Co-ordinator**
- **Gujarat Power Corporation Limited – Will facilitate & co-ordinate on behalf of EPD,**
- **Gujarat Urja Vikas Nigam Limited – Probable power procurer (PPA)**
- **Gujarat Energy Transmission Corporation (GETCO) - Transmission Facility Provider**
- **Gujarat Maritime Board - Port related Clearances, Port facilitator**
- **Environment & Forest Department, Govt. of Gujarat – Provide CRZ Clearance**
- **Gujarat Pipavav Port Limited - Private Port Developer – support port facility, if required**

GUJARAT ENERGY TRANSMISSION CORPORATION

Grid integration of Off-shore wind project

- **AC Voltage level :**
  - **220 KV at off-shore level**
  - **Up-gradation to 400 KV level at on-shore station**

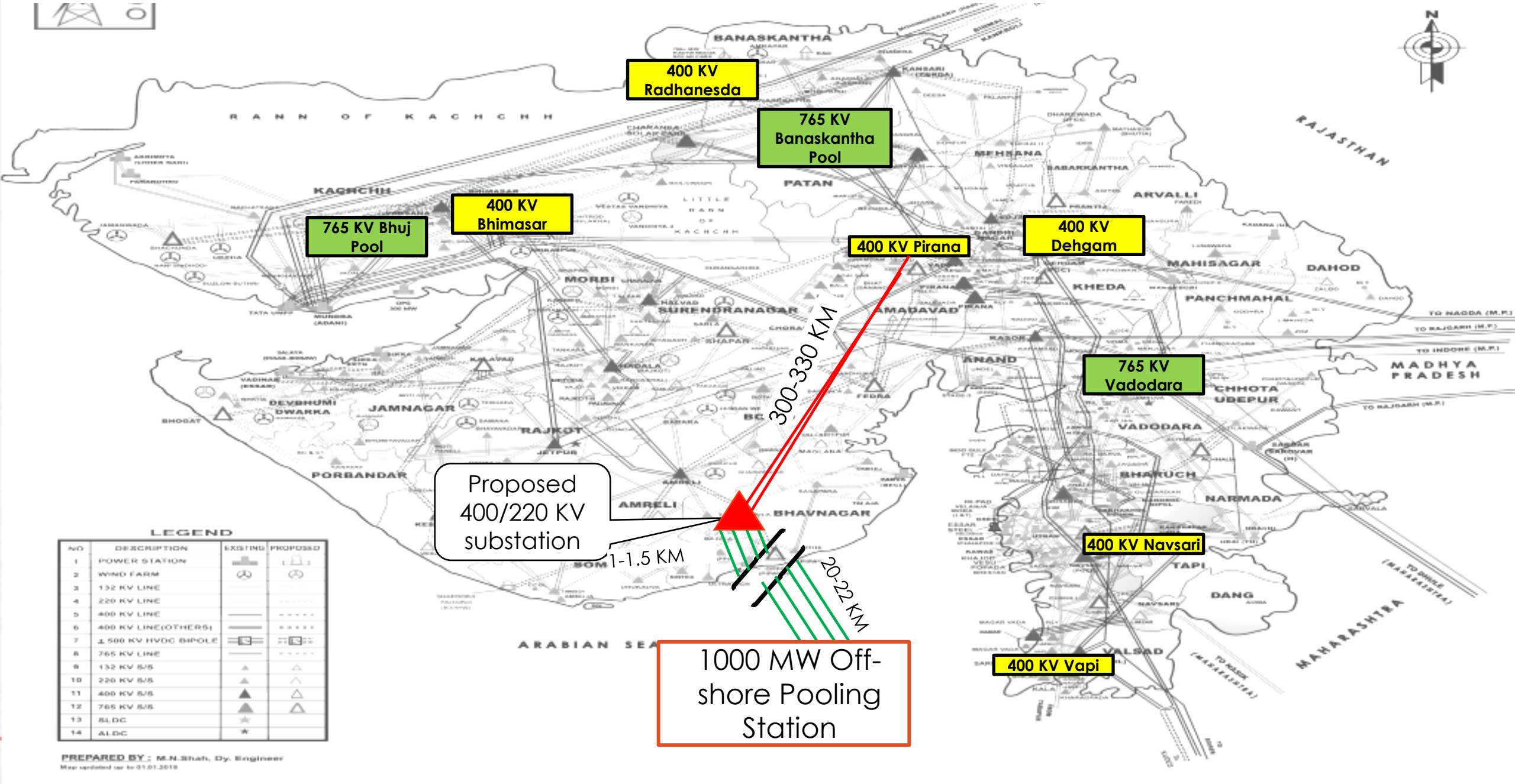
- **Intra-State (STU) / Inter-State (ISTS or CTU) connectivity**
  - **If beneficiaries are out of Gujarat, ISTS connectivity is preferable**
  - **No ISTS network in the close proximity**
  - **State network integration for consumption within Gujarat**

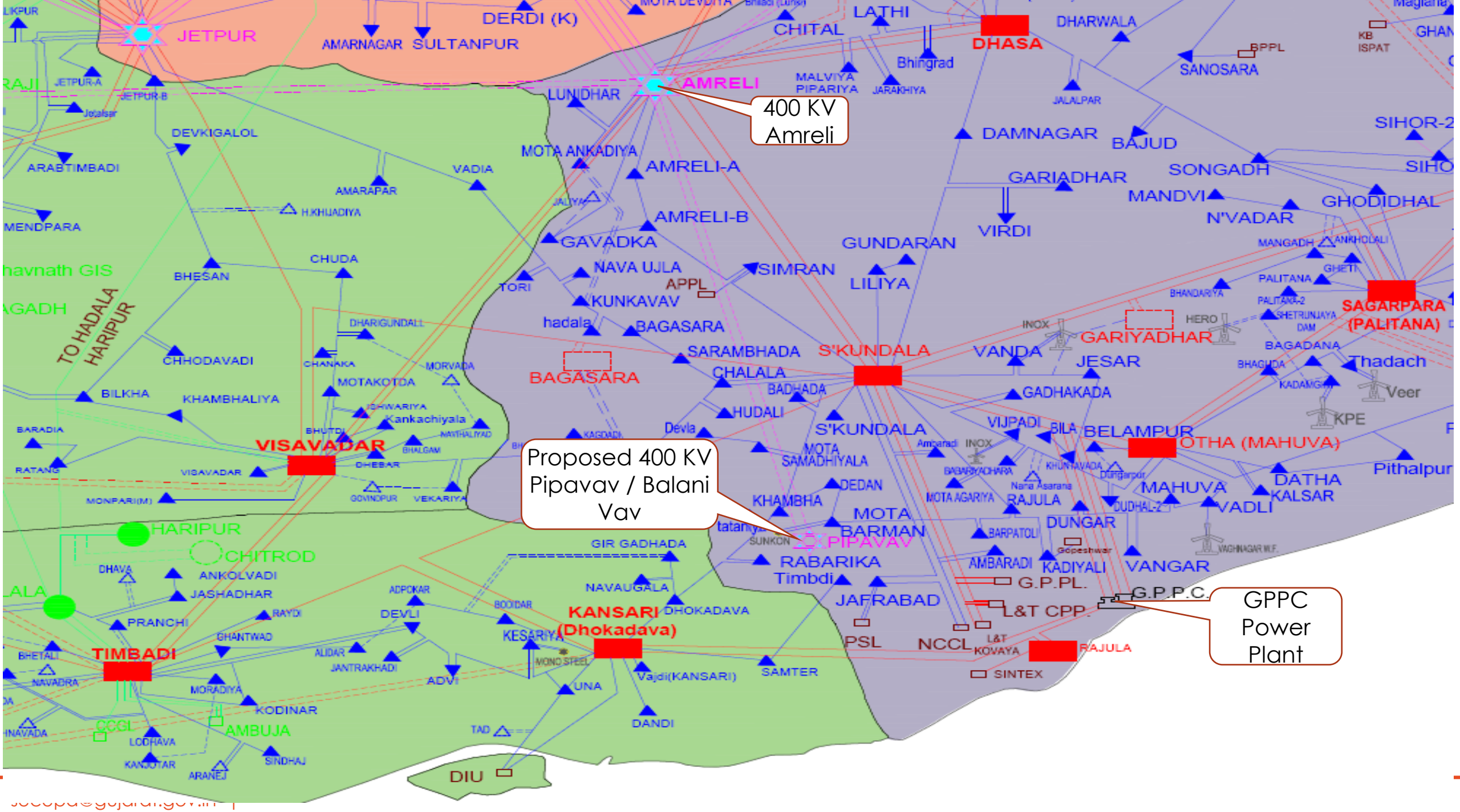
- **Pooling station : On-shore / Off-shore**
  - **Off-shore pooling station at 220 KV level**
  - **220 KV sub-sea cable for evacuation up to on-shore station**

  - **On-shore station at 400 KV level with 220/400 KV, 3 x 500 MVA transformer capacity**
  - **400 KV D/C on-shore station – Amreli line (Twin AL-59 conductor : approx. 90-110 Km)**

- **Smooth integration / Power Quality parameters**
  - **Adequate reactive power management**
  - **Harmonics / flicker management**

ISTS substation in Gujarat

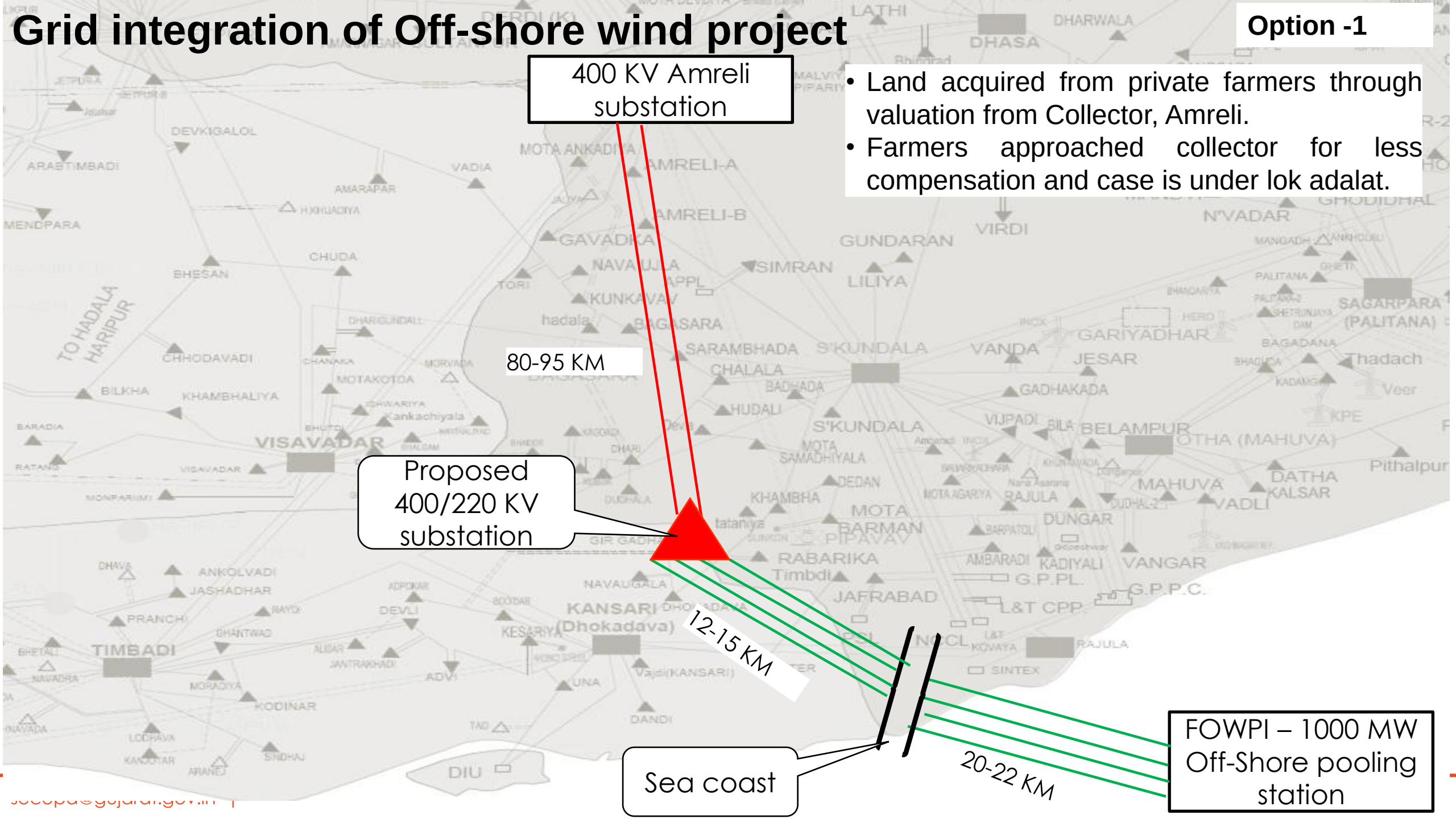



400 KV Amreli
Proposed 400 KV Pipavav / Balani Vav
GPPC Power Plant
JETPUR
AMARNAGAR
SULTANPUR
DERDI (K)
CHITAL
LATHI
DHASA
DHARWALA
SANOSARA
AMRELI
LUNIDHAR
MALVIYA PIPARIYA
JARAKHIYA
Bhingrad
DAMNAGAR
BAJUD
SONGADH
GARIADHAR
VIRDI
MANDVI
N'VADAR
GHODIDHAL
SIHOR-2
MOTA ANKADIYA
AMRELI-A
AMRELI-B
GAVADKA
NAVA UJLA
SIMRAN
APPL
KUNKAVAV
hadala
BAGASARA
GUNDARAN
LILIYA
SARAMBHADA
CHALALA
BADHADA
HUDALI
S'KUNDALA
VANDA
GARIYADHAR
JESAR
GADHAKADA
SAGARPARA (PALITANA)
BAGADANA
Thadach
Veer
KPE
VIJPADI
BELAMPUR
OTHA (MAHUVA)
MAHUVA
VADLI
DATHA
KALSAR
Pithalpur
DUNGAR
VANGAR
RAJULA
MOTA BARMAN
PIPAVAY
RABARIKA
Timbdi
JAFRABAD
G.P.PL.
L&T CPP
G.P.P.C.
AMBARADI
KADIYALI
BARPATOLI
PSL
NCCL
SINTEX
L&T KOVAYA
VISAVADAR
CHHODAVADI
BILKHA
KHAMBHALIYA
BARADIA
RATANG
MONPARI(M)
CHUDA
BHESAN
DHARIGUNDALI
MOTAKOTDA
CHANAKA
MORVADA
BHUTDI
DHEBAR
GOVINDPUR
VEKARIYA
BHALGAM
NAVTHALIYAD
Kankachiyala
ISHWARIYA
DEVKIGALOL
ARABTIMBADI
MENDPARA
AMARAPAR
VADIA
H.KHIJADIYA
JETPUR-A
JETPUR-B
Jotalsar
TO HADALA HARIPUR
HARIPUR
CHITROD
DHAVA
ANKOLVADI
JASHADHAR
PRANCHI
RAYDI
GHANTWAD
TIMBADI
BHETALI
NAVADRA
MORADIYA
KODINAR
CCCL
AMBUJA
LODHAVA
KANJOTAR
ARANEJ
SINDHAJ
GIR GADHADA
NAVAUGALA
DHOKADAVA
KANSARI (Dhokadava)
ADPOKAR
DEVLI
BOTIDAR
KESARIYA
MONO STEEL
ALIDAR
JANTRAKHADI
ADVI
UNA
Vajdi(KANSARI)
SAMTER
DANDI
TAD
DIU
TORI
KAGDADI
Devla
MOTA SAMADHIYALA
DEDAN
KHAMBHA
tatania
SUNKON
MOTA AGARIYA
Amparadi
INOX
BAGHAYADHARA
Nana Asarana
KHUNTAVADA
Dungarpur
CUDHAL-2
Gopeshwar
VAGHNAGAR W.F.
HERO
BHANDARIYA
PALITANA
PALITANA-2
SHETRUNJAYA DAM
GHETI
MANGADH
ANKHOLALI
BHAGUDA
KADAMGIRI
SIHO
KB ISPAT
BPPL
Magiana
GHAN

Grid integration of Off-shore wind project

Option -1

- Land acquired from private farmers through valuation from Collector, Amreli.
- Farmers approached collector for less compensation and case is under lok adalat.



Grid integration of Off-shore wind project

Option -2

400 KV Amreli substation

- Fresh acquisition of land near sea-shore.

95-110 KM

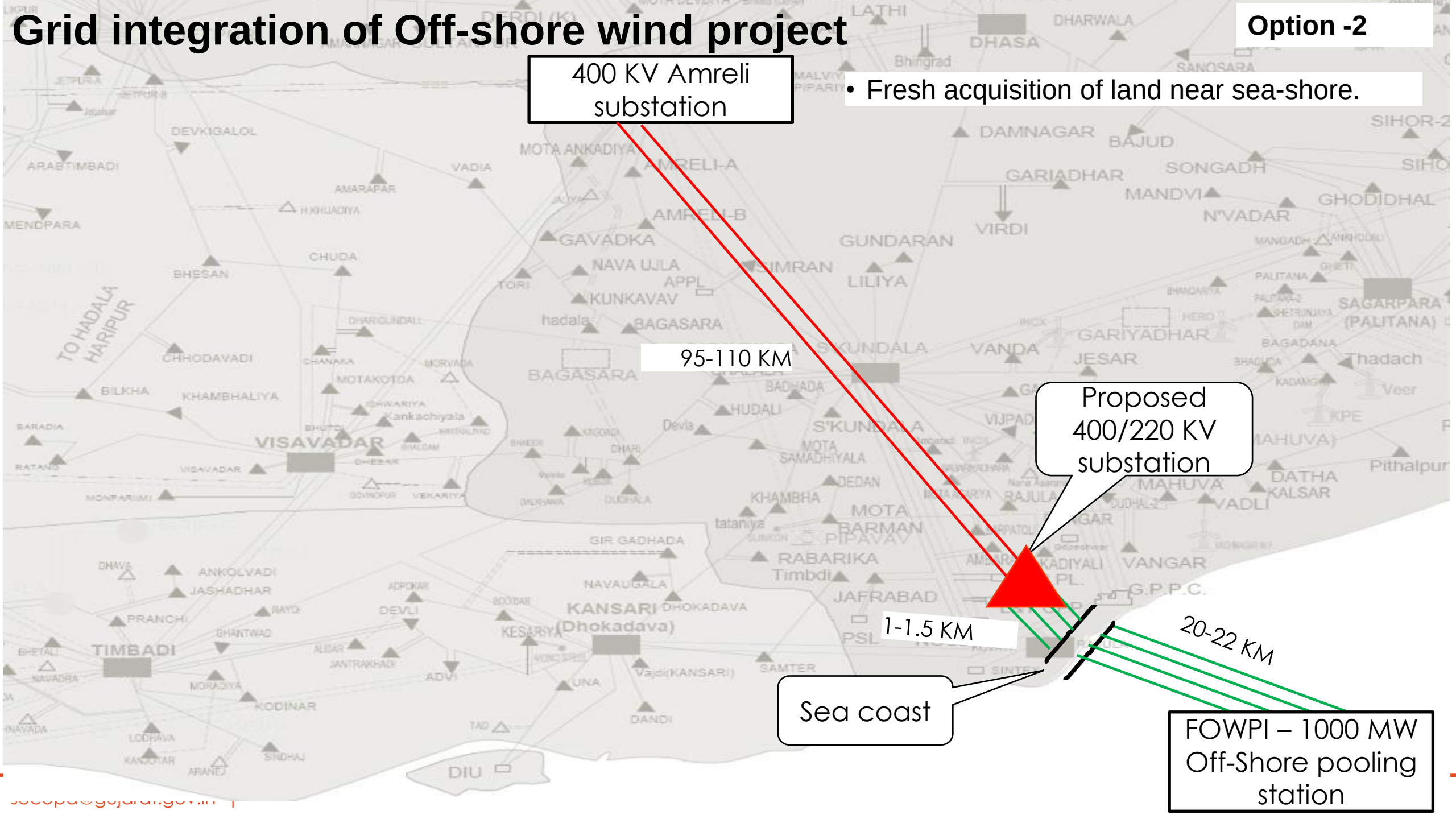
Proposed 400/220 KV substation

1-1.5 KM

20-22 KM

Sea coast

FOWPI – 1000 MW Off-Shore pooling station




PLS-CADD Overlay
220KV GPPC Dhokadva line
Nageshree
Uchaiya
Lunsapur
Rampara-2
220KV LILO GPPC
Vandh
Mitiyala
Last M/C tower
Kovaya
220KV GPPC
Google Earth
Image © 2018 DigitalGlobe
Image © 2018 TerraMetrics
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Jafarabad
Bhankodar


PLS-CADD Overlay
400KV Amreli S/S
Nobel Engineering College
Junagadh
Amreli
9/2
6/2
4/1
4/2
Exi.10
2/0
5/3
8/1
12/011/3
14/013/9
15/0
Palitana
Keshod
Savar Kundla
Talala
Veraval
Rajula
Mahuva
220KV GPPC Dhokadva line
220KV LILO GPPC
220KV Dhokadva S/s
Last M/C tower
Google Earth
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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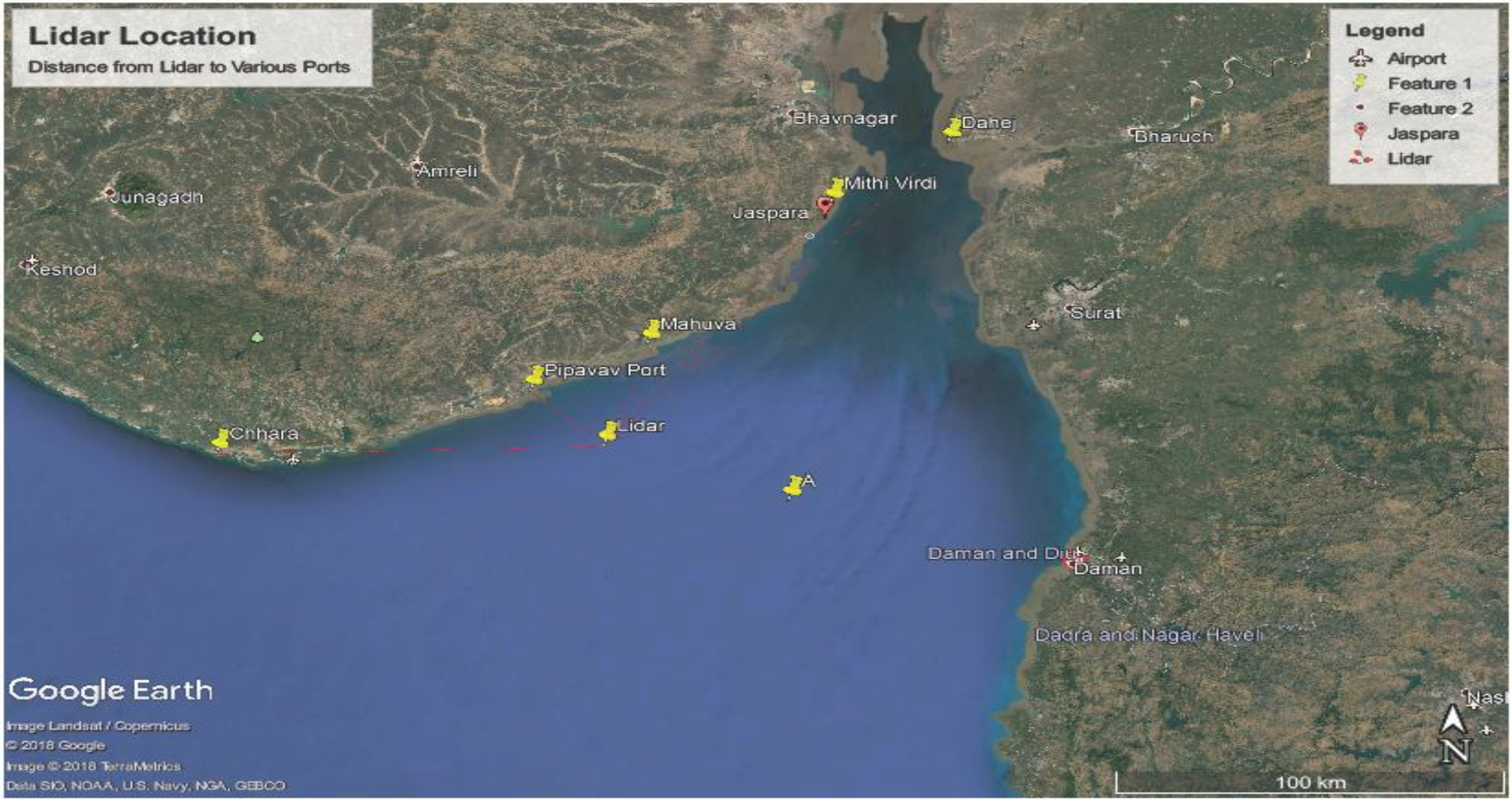
GUJARAT MARITIME BOARD

Location options for Offshore wind Power Project

Location	Distance from the proposed site	Port Facility	Acquired Land	Cargo Details	Traffic (mmt) FY 2017-18	Draft
Pipavav (Operational)	26 km ~ 14 nm	- All weather Port (Details) - Container Berth - Liquid Berth - Shipyard - LPG Berth	~ 631 Ha Available with port and shipyard	Container	6 mmt	- 13.5 mt CD
				Non- container	3 mmt	
Mahuva (Proposed)	35 km ~18 nm	New Facilities to be developed				- 11 mt CD
Mithivirdi (Proposed)	100 km ~ 54 nm	New Facilities to be developed				- 10-12 mt CD
Chhara (Under development)	100 km ~ 54 nm	- All weather Port - Bulk Terminal - Container Berth - LNG Terminal	~ 210 ha	Projected - Coal & bulk - Container - LNG	Projected 2020 - 15 mmtp - 2 MTUE - 10 mmt	- 14 mt CD
Dahej (Operational)	135 km - 73 nm	- All weather Port - LNG Berth - Multi-purpose solid cargo Berth	Not Available	**LNG**	**16 mmt**	- 14 mt CD
				Non-LNG	7 mmt	
Dahej (Under development)		New Facilities to be developed	112 Ha	New Facilities to be developed		


Lidar Location
Distance from Lidar to Various Ports
Legend
Airport
Feature 1
Feature 2
Jaspara
Lidar
Bhavnagar
Dahej
Bharuch
Amreli
Junagadh
Mithi Virdi
Jaspara
Keshod
Surat
Mahuva
Pipavav Port
Lidar
Chhara
A
Daman and Diu
Daman
Dadra and Nagar Haveli
Google Earth
Image Landsat / Copernicus
© 2018 Google
Image © 2018 TerraMetrics
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
N
100 km

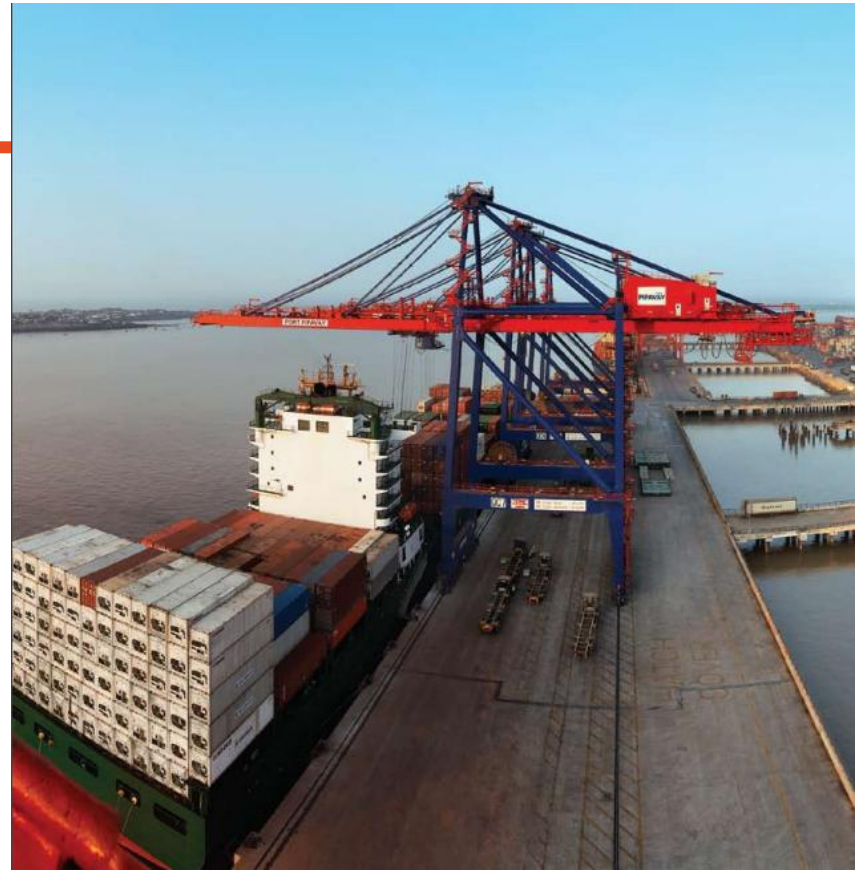
Policy Provision for Port Development

No	Particulars	Captive Jetty (BOT)	Private Port (BOOT)
1	Definition	A jetty constructed by a port based industry located in Gujarat for landing and shipping of their captive industrial raw materials or their finished product from the jetty	"The Port" means the port proposed to be developed at the identified Greenfield sites by signing a Concession Agreement with the Licensee (Developer)
2	Cost of Jetty/ Port incurred by	Port based industry owner	Port Developer
3	Tenure of Concession/Lease period	25 years	30 Years
4	Ownership of the Jetty/Port during the Concession Period	GMB from Day-1	Port Developer till BOOT period – Sept. 2028
5	Full Wharfage/ Water Front Royalty (Without Set Off)	Rate notified as per SoPC July 2012 Column 7	Base Rate Notified as per SoPC July 2012

GUJARAT PIPAVA PORT LIMITED - APM TERMINAL

PIPAVAV PORT

Port Pipavav, India's first private sector port, is an important gateway port on the West Coast of India for containers, bulk and liquid cargo. Pipavav Port is owned by APM Terminals which is part of the maritime giant - The A. P. Moller Maersk Group. APM Terminals operates ports & terminals in 58 countries with about 6% market share of global container throughput.



Public-private partnership

Pipavav Port operates under a concession agreement with Gujarat Maritime Board.

All-weather port

Pipavav is protected by two islands that allow all-year operations. It is a deep-water port with 14.5m draft

Excellent connectivity

11km four-lane expressway connects to the National Highway 8E which links to national network. A 269-km private rail line built in partnership with Indian Railways, links the Port to the rail network. The port has 9 operational sidings for various cargoes.

Multi-commodity port

The Port handles Bulk, Break-bulk, Containers, Liquid, LPG, Cars (RORO) and Project cargoes. It is also the preferred port for off-shore activities in the Gulf of Khambhat.

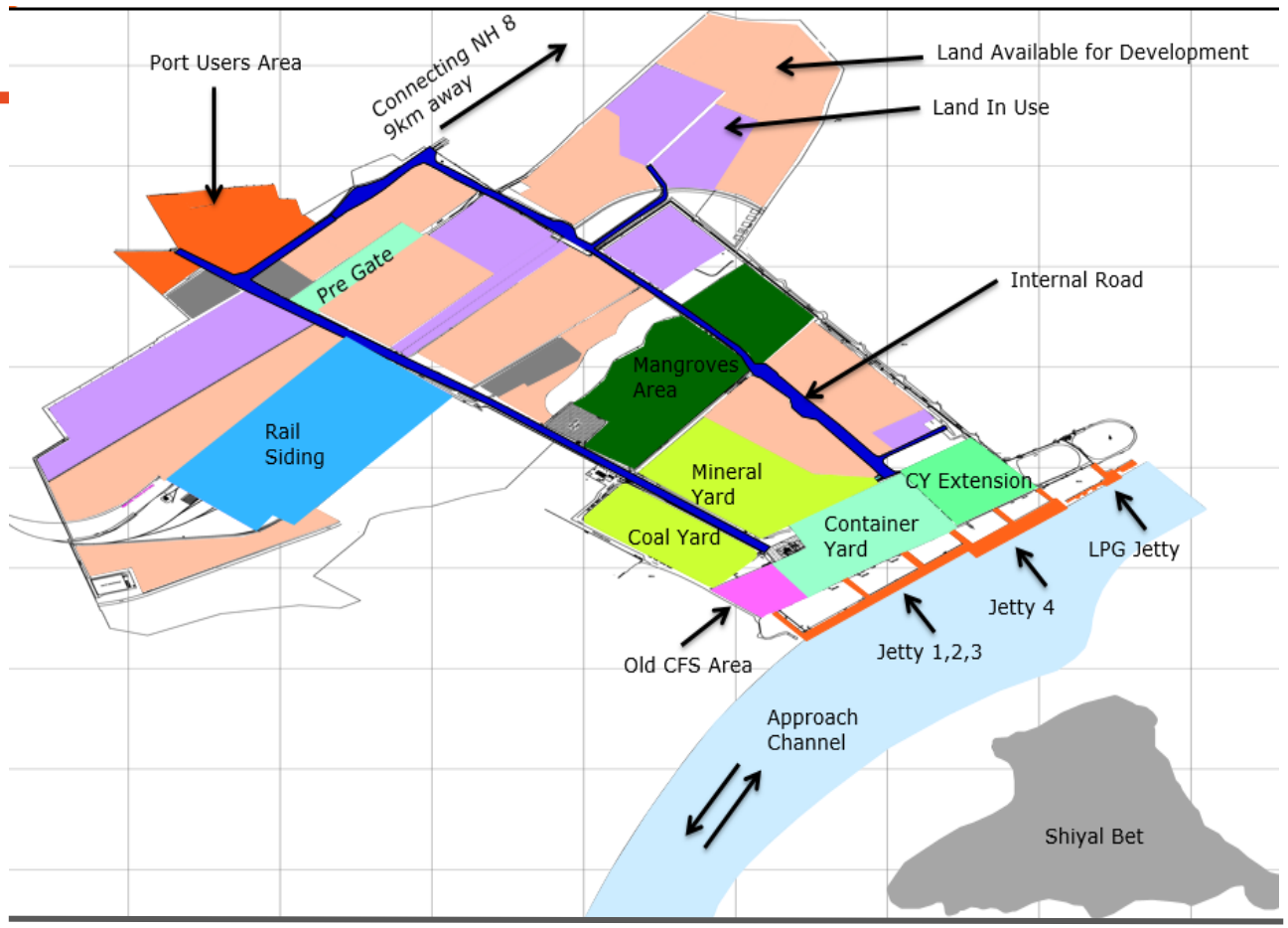
Capacity:

Container – 1.35m TEUs, Bulk: 4 MMT, Liquid – 2MMT, RoRo: 250,000 CEUs

Storage

The Port has ~475,000 sqm storage area for bulk cargo, ~260,000 sqm container yard and over 95,000 sqm of covered warehousing. In addition to this, the Port's liquid terminal has nearly 500,000 KL of tankages and the RORO terminal has paved stacking area for over 6000 cars.

INFRASTRUCTURE



Container storage
210,000 sqm
20 RTG, 4 RMGCs

Container berth
387 m length, 5 STS Cranes

Bulk storage
475,000 sqm

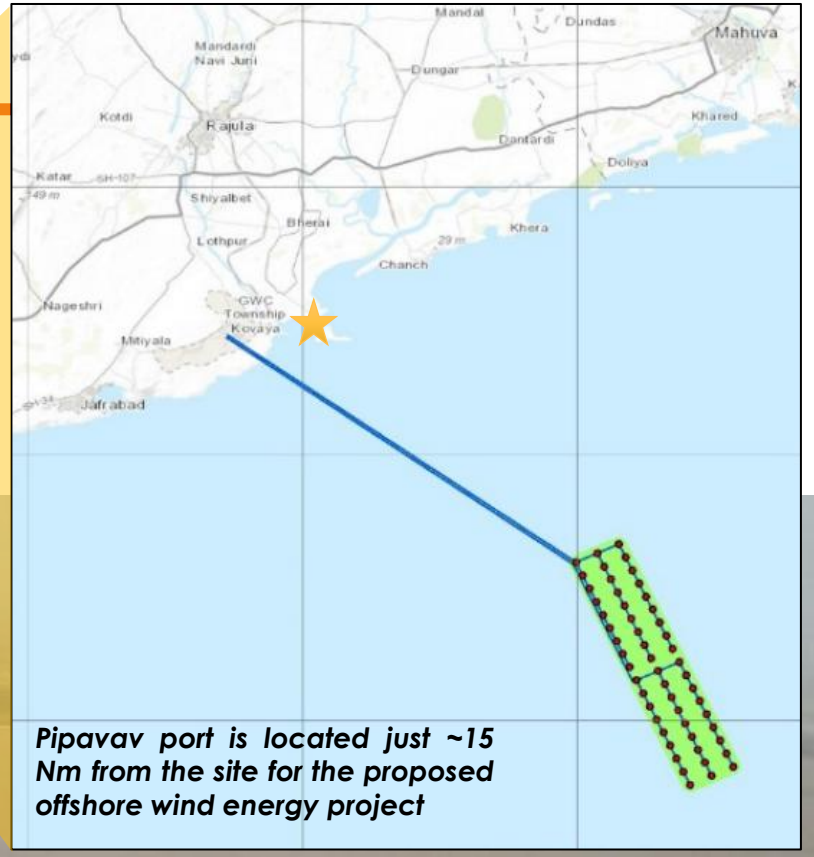
Bulk + Container berths
690 m length
3 berths for handling bulk, Container, RORO vessels
2 PHC + 3 STS Cranes

Liquid Jetty
190 m length
2 million tons capacity

Calm water basin protected naturally by 2 islands – all year operation possible. Access is through a 4 km long navigation channel which is 390 mtrs wide. Turning Circle for berth is 550 mtrs diameter and 13.5 mtrs deep. With a total land area of 631 hectares, there is plenty of land available for expansion of port-related services and businesses.

OFF SHORE CAPABILITIES

- Pipavav port has acted as the service base for a number of off-shore activities in the oil & gas sector. The port has also leased out land for a variety of services including liquid and RORO facilities. Dry-dock facilities are available next door for minor/major repairs for marine vessels/structures.
  With a large waterfront, deep draft & and ample storage area, Pipavav port is well suited to service India's first Offshore Wind Energy Project.



Pipavav port is located just ~15 Nm from the site for the proposed offshore wind energy project

Existing Port tariff for OSV/PSV vessels is available on Pipavav port website – www.pipavav.com

THANK YOU