



# **Tafila Wind Farm**

Jordan Wind Project Company PSC

***EIB Investments in Renewable Energy outside EU***

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# Jordan Wind Project Company



**A Success Story - First Commissioned Wind Project in Jordan/Region**

# Participants- Sponsors & Lenders

## Sponsors



INFRAMED



Masdar  
A MUBADALA COMPANY



EP GLOBAL ENERGY

MEMBER OF THE PARASKEVAIDES GROUP

## Lenders



# Advisory & Service Providers

## Legal



Hadidi & Co. Law Firm

## Engineering



## Accounting, Tax



## Account Banks



## Insurance



## Timeline

Q2 2011	MOU Signed with GOJ
Q4 2013	PPA / EPC / Finance Docs signed
Q2 2014	Commenced site works (21 month construction period)
Q1 2015	Turbine erection commenced
9/2015	Commercial Operations Start (20 yrs)

**Total Project Cost:** \$287m

**Lenders:** International Finance Corporation (IFC), European Investment Bank (EIB), Netherlands Development Finance Company (FMO), Europe Arab Bank (EAB), OPEC Fund for International Development (OFID), Danish Export Credit Agency (EKF) 77% of funding (\$221m)

**Sponsors:** Inframed Infrastructure, Masdar Power, EP Global Energy Ltd. 23% of funding(\$66M)

## Lenders

IFC: Mandated bank

EIB: Largest lender at \$72m

Loan: Repayments: Three to date

## Required Studies

- Environmental & Social Impact Assessment
- Baseline Environmental Surveys
- Avifauna surveys & reporting
- Wind measurement & reporting
- Topographic study
- Geotechnical study
- Grid Impact Study
- Transport study
- Preliminary Design works

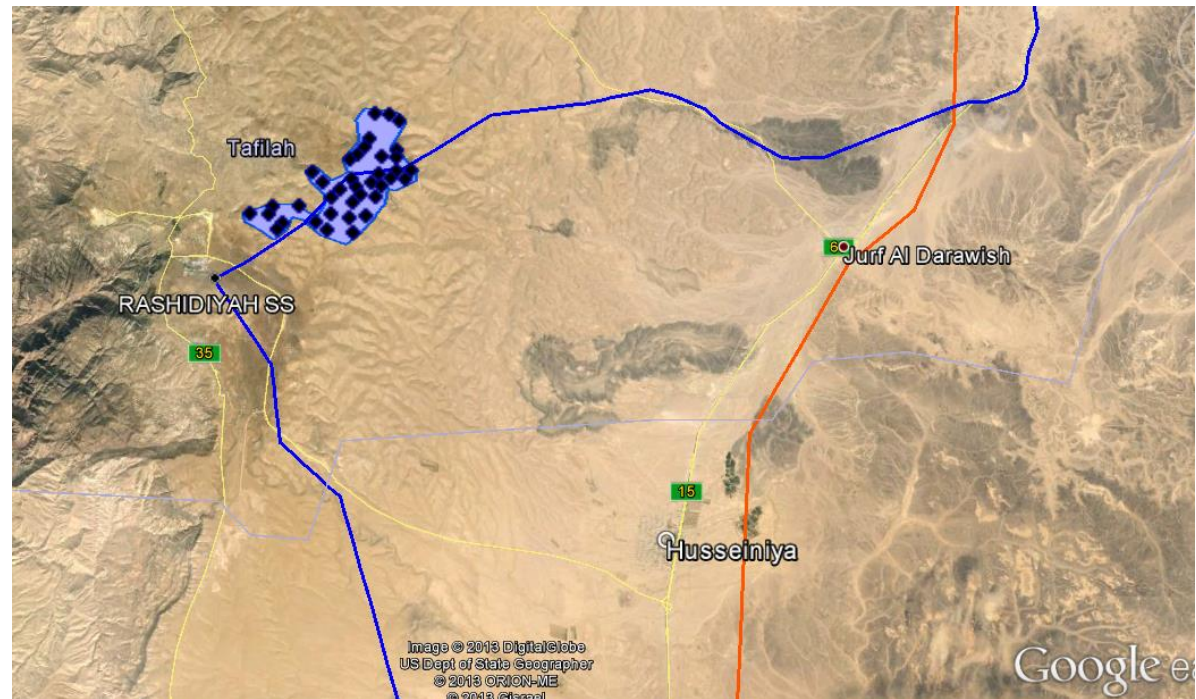
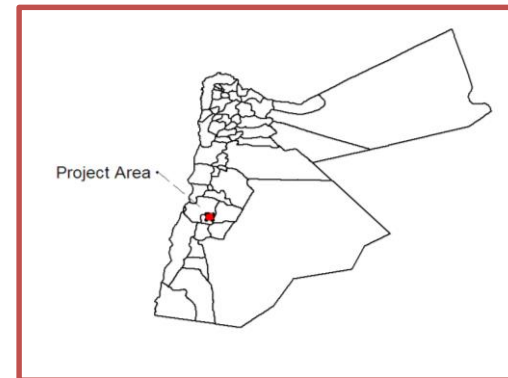


Required studies received input from lender technical / legal advisor throughout the process

# Development / Implementation Challenges

## Development:

- Land Acquisition & Title Documentation
- Tax Framework
- Project Documents
  - PPA / TCA
  - Financing Docs
  - EPC (DBOM) Contract
- Environmental (Avian monitoring / risk assessment)
- Permitting



## De-risking (Bankability)

- GOJ Guarantee on NEPCO Obligations
- Lender direct agreements (GOJ, Contractor, etc)
- PPA – currency adjustment provision
- Security Provisions (onshore / offshore assets)
- Due Diligence / KYC
- Strict environmental mitigation / monitoring program
- Bankable studies and contracts

## Accomplishments

- First privately sponsored utility scale wind farm in the Middle East
- First non recourse project finance renewable deal in Middle East
- First utility scale renewable plant in Jordan
- First renewable PPA and Generation License in Jordan
- Middle East Renewable Deal of the Year 2013 – Project Finance magazine
- First successfully commissioned RE project onto the NEPCO grid in September 2015

- Government Agreements, Financing Docs, DBOM Contract signed simultaneously
- December 2013 year end conditions satisfaction (DBOM)
- Deal of the Year Award 2013



## Permanent

- Roads
- Crane pads
- Foundations
- Turbines
- Cabling
- Substation (MV / HV)
- Warehouse & Control building
- Permanent wind measurement mast

## Temporary

- Sections of roads and crane pads
- Construction compound & storage area
- Some road entrances
- Temporary wind measurement masts

## Vestas V112 Turbine (Qty 38)

- 3.075 MW rated capacity
- 112m rotor diameter
- 94m tower height
- 3 – 25 m/s operating range
- Fully automated

Towers: Spain

Nacelle: Denmark

Gearbox: Germany

Blades: USA, Denmark

~400GWH / Year

CF @ 39%

Class II site



## Construction:

- Customs / Importation / Transport
- Wind conditions during turbine erection
- Crane logistics





HM the King landing onsite to inaugurate the wind farm project.

# PROJECT COMPONENTS





JWPC and NEPCO substation



Transformer Transport and Installation



Snow storm on site





Foundation excavation



Completed site road

## Roads / Crane Pads



Completed crane pad





Cable drum storage



## MV Cable works



33kV cable works



Foundation reinforcement works



Backfilled foundation

## Foundations



Completed Foundation  
ready for backfilling

# PROJECT COMPONENTS



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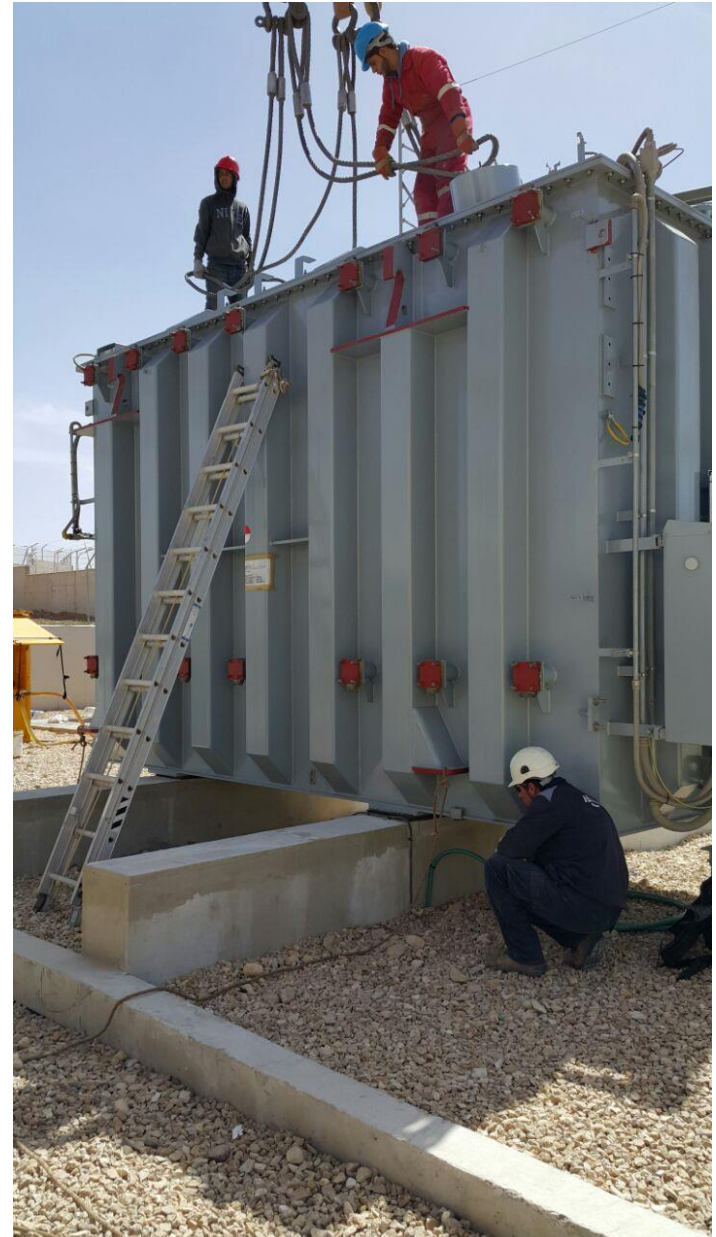
## Unloading & Transport



Component unloading in Aqaba



Pictures from the construction







## PROJECT COMPONENTS

View from the permanent met mast during the maintenance



Inspection of the top cooler at WTG





View from WTG 24

## Summary:

- The wind farm is operating at full installed capacity of 117MW
- The availability / performance of the turbines is very good (97.37% after TOC)
- Turbines do not have any major technical issues
- Cooperation with NEPCO is without any problems
- ESMMP tasks are being carried out in line with requirements

### **Regular JWPC site team activities:**

- Weekly inspections of substation electrical equipment
- Weekly inspections of the buildings and site roads
- Monthly inspections on the spare parts
- Monitoring Vestas activity
- Regular WTGs inspection
- Monitoring WF performance – evaluation of the data from the WTGs
- Reporting – weekly internal reports, monthly reports
- Billing
- Monitoring H&S on site
  
- Environmental activities:
  - Carcass searching on weekly basis (dropping to 2 x month in winter)
  - Bird monitoring
  - Monthly inspection of the site in terms of environmental.

# HSE Statistics – Since Taking Over



Month	Events for the month			Total
	OHS Near Misses	First Aid Injury	Lost Time Injury	
<b>12/2015</b>	0	1*	0	1
<b>1/2016</b>	0	0	0	0
<b>2/2016</b>	0	0	0	0
<b>3/2016</b>	0	0	0	0
<b>4/2016</b>	0	0	0	0
<b>5/2016</b>	0	0	0	0
<b>6/2016</b>	0	0	0	0
<b>7/2016</b>	0	0	0	0
<b>8/2016</b>	0	0	0	0
<b>9/2016</b>	0	0	0	0
<b>10/2016</b>	0	0	0	0
<b>11/2016</b>	0	0	0	0
<b>12/2016</b>	0	0	0	0
<b>01/2017</b>	0	0	0	0



Thank you very much