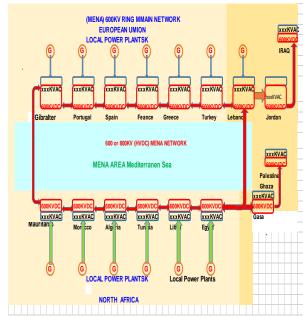
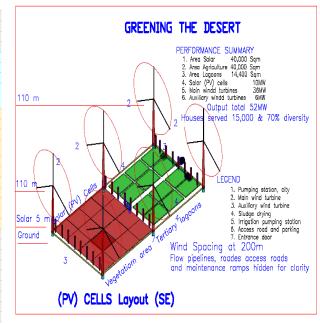
# **FloatNRG Systems**

## Floating (WT), (MENA), (PAN ARAB) and Greening the Desert







#### **ABSTRACT**

**FloatNRG** is an offshore energy extracting system for; wind, tidal and sea waves, installed on a floating "Tension Leg Platform" (TLP) and utilizing the space between main wind turbines".

**Platform** for equipment support is a **novel** (6-DOF) (TLP) with square or triangular foot print anchored with tension tether lines to the seabed at 30m depths.

**Floats** provide the uplift for the floating platform.

**60MW Wind Farm provides** Output KWh per year from;

Main (WT) 10x6MW 1,800,000,000
 Space addental (40%) 71,426,323
 Total FloatNRG KWh 251,426,323

### **ABSTRACT**

**650KV (HVDC) NETWORK** connects Europe, (MENA) area an Africa in a (RMN) connecting; Lebanon, Turkey, Greece, France, Spain, Portugal, Gibraltar, Morocco, Algeria, Tunisia, Libya, Egypt and back to Lebanon.

Contributes to Pan-Arab network.

**Lebanon** would be provided with **4,000 MW** in less than 2-years by importing power from Turkey and/or Egypt.

### **ABSTRACT**

**Full Utilization** of the open desert area allocated for a solar system is achieved using the (GTD) system.

**Supporting Structure** of (PV) Cells is raised 5-m above ground level.

**Agricultural Area** provided under the supporting structure is freely.

**Wastewater Treatment** is added to provide irrigation water.

**Providing** at each house a grinder for converting organic wastes to liquid and disposing into the wastewater network, as prerequisite for granting building permits.

## **FLOATNRG**

#### **DESCRIPTION**

**Offshore Wind** installation is needed for higher availability of wind and wave energies due to high wind speeds and high waves.

**Floating Installation** is also needed due to high cost of mono-pile wind turbine supports beyond 30meter sea bed depths.

**FloatNRG Developed** a floating platform (\*) to support wind turbines and marine energy extraction equipment, offshore at high sea bed depths.

**Space Between (WT)** is utilized to extract additional wind and marine energies from sea waves and tidal energies.

**Existing Installation** easily accept development of space between installed wind turbines.

#### **EXTRACTION EQUIPMENT**

- Wind Energy is provided by conventional horizontal axis (WT).
  - **Vertical Axis** (WT)s are installed in the space between the main (WT) extracting additional 47% wind energy. (1).
- Wave Energy.
  - Marine Turbines (VAXMT) per (TLP) to extract front and lee sides of waves. (1).
  - Rack and Pinion design (\*) acting as point absorber and marine water turbine (HAXMT) directly driving generators to extract; potential, kinetic and horizontal wave energies. Three (3) sets installed per (FCU) unit (1).
- Tidal Energy using the same (HAXMT) as for the (R&P) turbine.

### **ADDITIONAL FACILITIES**

- Marine Laboratory, off shore floating for monitoring sea and wind states.
- Test Tank, full scale installed to monitor actual sea and wind states for
- Open System for installing extraction different equipment.
- Energy Storge (\*) in the (TLP) in the form of compressed air up to 60,000 cubic meters for 60MW wind farms.

**FABRICATION and ASSEMBLY** complete with all equipment installed at the shore line, floated and towed for installation at final location without marine cranes.

#### LEBANON POWER SHORTAGE

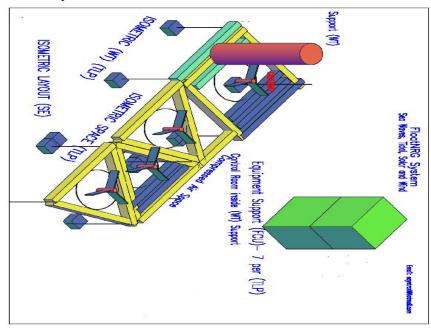
- SOLVED by providing 60 to 150MW offshore FloatNRG system at each of; Akkar, Batroun, Beirut, Sidon and South Lebanon.
- > "Electricite de France" (EDF) are encouraged to implement their plans to develop (MENA) area power network.
- > "Electricite de Liban" (EDL)/ (MoEW) are urged to:
  - a. **Review** these proposals and enter into a Sovereign (PPA) with FloatNRG and/or other contractors to develop one or a combination of these projects.
  - b. **Import 2,000MW** of electric power directly from Egypt and/or Turkey via marine and underground 650KV (HVDC) cables. Plans, approvals and funding are available including (PPA) Agreement.
  - c. **4,00MW** would be available in less than two years without (EDL) investment.
  - d. 400KV (AC) (EDL) plans to upgrade existing 220KV network would not be required. Refurbishing existing networks would be sufficient as these proposals provide distributed power plants.
- Lebanon Becomes a Hub for control of (MENA) area power and (Pan Arab) networks and a fabrication/assembly center for floating wind turbine farms for (MENA) area.

#### **PERFORMANCE**

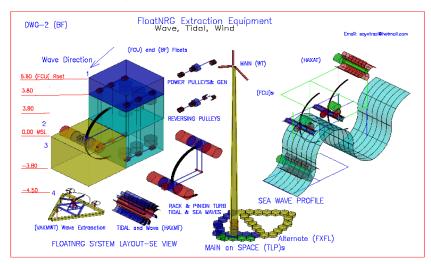
Additional Output, 40% energy extraction from the spaces between the main (WT).

		Re	esisting N	loment T	on-m	6,346	Duration	Wind/Wav	e Hours.Yi	3,000	Tidal	7,000		
				Data	per (TLF	) per (Ti	LP)		60MW Wind Farm		10	150MW	MW Wind Farm	25
PERFORMANCE	TYPE	Unit	Quantity	_ •	Uplift Ton	•	Energy KWh/Year	Compr 'd Air Cum	Rating KW	,	1		٠,	Compr 'd Air Cum
Equipment Main (WT)	(HAXWT)	No	1	400	0.00	6,000	18,000,000		60,000	180,000,000	N/A	150,000	450,000,000	N/A
Equipment Space Sub Total (TLP)	Steel	N/A	47	6.45	0.00	441	1,322,710	0.00	23,809	71,426,323	N/A	63,490	190,470,194	N/A
GRAND TOTAL-Equipment				406	0	6,441	19,322,710	0	83,809	251,426,323		213,490	640,470,194	
Floats Main (WT) (TLP)		No	8	418	1,241	N/A	0.00	1,091	N/A	N/A	10,911	N/A	N/A	27,277
FLOATS SPACE (TLP)		No	4	308	704	N/A	0.00	898	N/A	N/A	48,510	N/A	N/A	129,359
TOTALS											59,421			156,637
ANCHORS - Main (WT) (TLP)														
NET Uplift Floats (WT) per Corner				10	6		NET Uplift	Floats Space	e per Corn	er	101			
NET ANCHOR Main (WT) (TLP)					24		ANCHOR a	t Space (TLI	P)			124		

# **SYATEM** Layout



# **EQUIPMENT** Layout



## **CALCULATION**

CALCULATIONS						Densit	Kg per Cum											
CALCULATIONS				FRP	M. Seel		Sand WET	AIR	g m/Sec2	KW = Kg-mSe	С							
				1.6	6.7	2.7	2	1.22	9.8	102.2								
			ace betw	OACT)	191.52	No61	Main (WT)	10	(TLD) C	D.t	ACTO	6	Lenath n	(TLD)	30			
		91	Dace Detw	een (WI)	191.52		and Characteristic p		(ILP) Spa	ices Between (	Weight	_	Length n Uplift		Moment	A	Moments	Ton
EQUIPMENT per Main (TLP)	TYPE	11-34	Quantity	Rating KW	Total KW		Height or Length m			Force Hrz'l Ton			Per Unit	_	_	Resisting	Bending	Resisting
Equipment Main (WT)		No	Quantity			M. Steel	82.00				Per Unit 400.00	400	0.00	0.00	83.92	31.92	Devloper	Resisting
Space Equipment per (TLP)	(HAXW	No	1	6,000	6,000	M. Steel	82.00	104	18,600	Developer	400.00	400	0.00	0.00	83.92	31.92	Devioper	
Space Equipment per (TLP) Space Eqpt Wind Turbine (WI)	(VAXW	No	4	53	213	M. Steel	30	5.5	165	Developer	0.15	0.60	0.00	0.00		Develope	L	
Spaace Eqpt Wave Marine Turbine	(VAXW	No	1	123	123	M. Steel	N/A	9	254	Developer	0.15	0.15	0.00	0.00	Develope Develope	Develope		-
Spice Egot Wave Rack & Pinion	R&PIN	No	21	4	84	M. Steel	4	0.3	N/A	N/A	0.15	3.15	0.00	0.00	Develope	Develop		
Space Egot Tidal Marine Turbine	R&PIN	No	21	1	21	M. Steel	N/A	9	254	N/A	0.15	3.15	0.00	0.00		Develop		
Space Egpt Wave Energy	BFLT	No	21	4	84	FRP	0.50	0.75	0.88	N/A	0.50	10.50	0.00	0.00		Develop		
Equipment Space Sub Total (TLP)		N/A	47		441					N/A	0,600	6,450						
		rest		1						100	0.000	2.400						
				Data			Dime	nsions m		Volu	me Cum		Weight	Ton	Uplif	t Cum		Desirting
FLOATS Main (WT) (TLP)	TYPE	Unit	Quantity	Rating KW	Material	enght or	Widdth	Height	Thick or R	Out	ln	Materia I	Per Unit	Total	Per Unit	Total	Compr 'd Air Cum	Resisting M't Ton n
Floats Main (WT) (TLP)	Rectir	No	4	N/A	M. Com	30	1.92	1.92	0.07	111	95	16	44	177	111	442	378	
Additional Floats Main (WT) (TLP)	Rectir	No	2	N/A	M. Com	32	3.00	3.00	0.07	287	260	27	77	154	287	575	520	
Equipment Floats Support	Rectir	No	2	N/A	M. Com	28	2	2.00	0.07	112	96	16	43	87	112	224	193	
Equipment Support (FCU)	Rectir	Lm	68	0	M. Steel	0.050	3.00	2.5	0.01	0.534	0.342	0.192	0.519	35.300	0.000	0.000	0.000	
Tether Line	Rope	Lm	4	N/A	M. Steel	0.015		30		0.0212	0	0.0212	0	0	0.0212	0.0848	0	
Sub Total Floats Main (WT)	(TLP)	No	8	N/A						510	451	59	165	418	510	1,241	1,091	
Total Floats Main (WT)	(TLP)													818		1,241		6,346
		_																
FLOATS SPACE (TLP)				Data			Dime	nsions m		Volu	me Cum		Weight	Ton	Uplif	t Cum	Compr 'd	
TECKTO OF AGE (TET)	TYPE	Data	Quantity	Rating KW	mensions	enght or	Widdth	Height	Thick or R	Out	In		Per Unit	Total	Per Unit	Total	Air Cum	
Space Floats (TLP)	Rectir	No	4	N/A	M. Com	30	2.00	2.00	0.07	120	103	17	46	185	120	480	378	
Space Floats Equipment	Rectir	No	2	N/A	M. Com	28	2.00	2.00	0.07	112	96	16	43	87	112	224	520	
Equipment Support (FCU)	Steel	Lm	68	N/A	M. Steel	0	2	3	0	0.534	0.342	0.192	0.519	####	0.000	0.000	0.000	ĺ
Tether Line	Rope	Lm	4	N/A	M. Steel	0.0150	0.0000	30.0000	0.0000	0.0212	0.0000	0.0212	0.0573	0.2290	0.0212	0.0848	0.0000	1
SpaceFloats Sub Total	Rectir	No	6	N/A						233	200	33	90	308	232	704	898	
Total Floats Space (TLP)		No												308		711		
, ,				Data			Dime	nsions m		Volu	me Cum		Weight	Ton	Unlif	t Cum		
ANCHORS - Main (WT) (TLP)	TYPE	Data	0	0	0	enght or	Widdth	Height	Thick or R	Out	0		Per Unit	Total	Per Unit	Total		
NET Uplift Floats (WT) per Corner	TYPE				M. Com										106			
			4		M. Com	4,65	4.65	4.65	0.30	101	66	34	225	900		402		
										101	- 00	-	220	000	<u> </u>	702		
Anchors at (WT) (TLP)		0	-		M. COIII	4.00									-124			
		0	,		m. com	4.00									-124			
Anchors at (WT) (TLP) NET ANCHOR Main (WT) (TLP) ANCHORS - SPACE (TLP)	TYPE	0	-			4.00												
Anchors at (WT) (TLP) NET ANCHOR Main (WT) (TLP) ANCHORS - SPACE (TLP) NET Uplift Floats Space per Corner	TYPE Rectir	0			M. Com	4.00									-124			
Anchors at (WT) (TLP) NET ANCHOR Main (WT) (TLP) ANCHORS - SPACE (TLP)	_	No	4			4.65	4.65	4.65	0.30	101	66	34	225	900		402		

# **PERFORMANCE Summary**

		Resisting Moment Ton-m 6,346 Duration Wind/Wav						Wind/Wav	e Hours.	3,000	Tidal	7,000		
			Data per (TLP) per (TLP)					P) 60MW Wind Farm			10	150MWN	25	
PERFORMANCE	TYPE	Unit	Quantity				Energy KWh/Year			,	1			Compr 'd Air Cum
Equipment Main (WT)	(HAXWT)	No	1	400	0.00	6,000	18,000,000		60,000	180,000,000	N/A	150,000	450,000,000	N/A
Equipment Space Sub Total (TLP)	Steel	N/A	47	6.45	0.00	441	1,322,710	0.00	23,809	71,426,323	N/A	595,219	1,785,658,065	N/A
GRAND TOTAL-Equipment				406	0	6,441	19,322,710	0	83,809	251,426,323				
Floats Main (WT) (TLP)		No	8	418	1,241	N/A	0.00	1,091	N/A	N/A	10,911	N/A	N/A	27,277
FLOATS SPACE (TLP)		No	4	308	704	N/A	0.00	898	N/A	N/A	48,510	N/A	N/A	129,359
TOTALS											59,421			156,637
ANCHORS - Main (WT) (TLP)														
NET Uplift Floats (WT) per Corner				10	6		NET Uplift	Floats Spac	e per Co	rner	101			
NET ANCHOR Main (WT) (TLP)					724		ANCHOR a	t Space (TLI	P)			124		

# 650KV (HVDC) (MENA) AREA RING MAIN NETWORK

### **DESCRIPTION**

**650KV (HVDC) NETWORK** connects Southern European and Northern African countries in a "Ring Main Network" (RMN) with radial lines to neighboring countries and islands as (MENA) (RMN). **(MENA) Countries** are; Lebanon, Turkey, Greece, France, Spain, Portugal, Gibraltar, Morocco, Algeria, Tunisia, Libya, Egypt and back to Lebanon.

**LENGTH** of the (MENA) (RMN) is 5,000Km

**2,000MW** are provided by local power plants giving **4,000MW** at each local (DC).(AC) conversion station.

**PAN ARAB Network** is a result of this (MENA) (RMN) and covers; Ghaza, Palestine, Jordan and Irag.

Total Length of the (RMN) is 5,000Km,

**POWER LOSS** is estimated at (2%) per 1,000 km for transmitting 5,000MW for 3,000 Kilometers and (1.5%) for both converter stations at the sending and receiving ends.

**Higher Capacities** for longer distances are presently in operation in Brazil and in China.

### **ADVANTAGES**

**(MENA) (RMN) Connects** Europe, (MENA) Area, Pan Arab network and Africa to provide viable and dependable power supply. **FUTURE PROJECTS** are planned for connecting power plants and load centers with (HVDC) transmission lines.

### **COMPETITORS**

**FRANCE (EDF)** has power plans for (MENA) Area and may be associated with to develop this project.

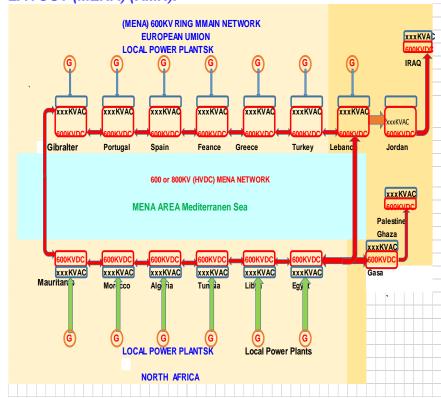
## LEBANON POWER SHORTAGE

**SOLVED** by importing electric power from Egypt (Port Sa'eed) and from Turkey and act as a hub for the (MENA) (RMN) power network.

### **PHASING**

<b>Phasing</b>	Sequenc	е									
Phase I	Lebanon	$\longrightarrow$	Egypt								
Phase II	Lebanon	$\longrightarrow$	Jordan	$\longrightarrow$	IRAQ	Radial L	ine				
Phase III	Egypt	$\longrightarrow$	Libya	$\longrightarrow$	Tunisia	$\longrightarrow$	Algeria	$\longrightarrow$	Morocco	$\longrightarrow$	Mauritania
Phase IV	Lebanon	$\longrightarrow$	Turkey	$\Longrightarrow$	Greece	$\Longrightarrow$	Italy	$\longrightarrow$	Spain	$\longrightarrow$	Gibralter
Phase V	Lebanon	$\longrightarrow$	Syria	Radial L	ine						
Phase VI	Lebanon	$\longrightarrow$	Cyprus	Radial L	ine						

## LAYOUT (MENA) (RMN).



## **GREENING the DESERT**

### **DESCRIPTION**

**Full Utilization** of the open desert area allocated for a solar system is achieved using the (GTD) system.

**Supporting Structure** of (PV) Cells is raised 5-m above ground level.

**Agricultural Area** provided under the supporting structure is freely.

Sunlight is provided by leaving (10%) of the solar area to allow infiltration of sun light to the Agricultural area below.

**Wastewater Treatment** is added to provide irrigation water.

**Wind Turbines,** are added above the solar system to provide additional energy.

### **EQUIPMENT**

Solar Energy (PV) cells

Wind Energy (HAXWT) and (VAXWT)
Wastewater Tertiary Oxidation Lagoons

**Pumping Staten** at the city for delivering wastewater to the (GTD) system.

### **DESIGN DATA**

Output Solar (PV) cells per Sqm 250 Watts.

Electric Power per housing unit 5 KW

Block Area (PV) cells, Sqm; 40,000

Tertiary Lagoon 40 x60 meter

Waste Water 640 L/Day/housing unit

Capita per Housing Unit 4 members.

**Diversity Factor** 70 %

## **PERFORMANCE**

Utility Scale Projects for (1) to (6) blocks. Solar System 40.000 to 60.000 Sam Lagoons 40.000 to 120.000 Sam **Output Solar** 10 60MW to **Output Wind** 120MW to 180MW Agricultural Area 40.000 to 240,000 Sqm, Wastewater Treatment 6,603 to 22,857 LPDay Total Area 240,000 to 320,000 Sqm

### LEBANON POWER SHORTAGE

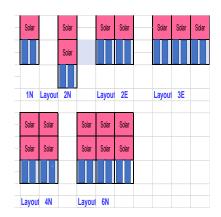
**SOLVED** by implementing the (GTD) system at; Hermel, Baalback, South Lebanon and Akkar and,

**Converting Organic** wastes to liquid and disposing into wastewater network.

**PERFORMANCE Summary** 

		(WT)	Space	Compr'd	Pow	er KW	Energy KW-hour per Year	
Wind Turbine Farmss, 6MW (WT)	Unit	(TLP)	No.	Air Cum	Main	FloatNRG	Main	FloatNRG
Main (TLP), with 6MW (WT)	No.	10	64	68,404	60,000	88,218	1,800,000,000	2,646,534,194
Space (TLP) with 6MW (WT)	No.	25	169	179,095	150,000	224,513	11,250,000,000	16,838,448,387

								Outp	out per Unit	MW
						Length m	Width m	Solar	(HAXWT)	(VAXWT)
		Quant	ities			200	200	0.25	6	0.25
Activity Description	Chit	Solar	Agriculture	Lagoons	(HAXWT)	(VAXWT)	Solar Sqm	Area Total	Solar MW	Total MW
Solar - 1N	No	1	1	6	6	24	40,000	80,000	10	52
Solar - 2B	No	2	2	6	8	32	80,000	120,000	20	76
Solar - 2E	No	2	2	12	9	48	80,000	160,000	20	86
Solar - 3N	No	3	3	18	12	72	120,000	240,000	30	120
Solar -4N	No	4	4	12	12	64	160,000	240,000	40	128
Solar - 6N	No	6	6	12	16	96	240,000	320,000	60	180



### **LAYOUT**

