Energy Budget Worksheet – Sparrow

					Consumption – Offshore	
Loads	**Appliance**	**Mfg – Model**	**Usage Assumption**	**Amps**	**Hours**	**AH/Day**
Lighting	Tricolor		Auto-on/off	0.5	8	4.0
	Deck		30 min per day	1.0	0.5	0.5
	Interior		6 hrs per day	0.2	6	1.2
	Instrument & Panel Lights		10 hrs per day	0.1	10	1.0
	Handheld Spot Light		Rare	0.5	0	0.0
	Headlamp		Battery powered (spare batteries)	0.0	0	0.0
Electronics	Autopilot	NKE Gyropilot 2, L&S Ram	Continuous	3.6	24	86.4
	VHF (stdby)	SHGX-2200	Rare	0.6	0	0.0
	VHF (transmit)	SHGX-2200	Rare	5.0	0	0.0
	SSB	Icom 710	Rare	7	0	0.0
	AIS Transponder	Vesper Watchmate 850	Continuous	0.3	24	6.0
	AIS Splitter	Vesper sp160	Continuous	0.1	24	1.6
	Active Radar Reflector (standby)	Echomax XS	Continuous	0.03	24	0.7
	Radar (active)	Furuno 1815	Watchman mode – 1 min every 20 min	3.2	1.2	3.8
	Radar (standby)	Furuno 1815	Watchman mode – 1 min every 20 min	0.8	22.8	18.2
	Heding Sensor	Furuno PG-500	Continuous	0.1	24	2.9
	Sailing Instruments	NKE	Continuous	1.39	24	33.4
	12v/12v Power Conditioner	DD-1212-036	Continuous, 93% efficiency on NKE system	0.1	24	2.7
	Battery Monitor	Balmar Smartguage	Continuous	0.0	24	0.1
	Computer (standby)	Lenovo X260	8 watts idle	0.7	20	13.3
	Computer (active)	Lenovo X260	20 watts 6 hrs/day	1.7	4	6.7
	Satphone	Iridium 9575	Weather downloads & 20 min talk per day	1.0	1	1.0
	Tracking Device (stdby)	YB3i?	Continuous	0.0	23	0.7
	Tracking Device (transmit)	YB3i?	Continuous	0.5	1	0.5
	Barometer	Mitaka Duo	Continuous	0.0	24	0.9
	Clocks		Continuous	0.0	24	0.7
	Kindle	Oasis		0.2	3	0.6
Pumps/Other	Water ballast pumps	Rule 3800 (4)	10 min per day @ 15 amps	15.0	0.2	2.5
	Large Bilge Pump		Rare	0.0	0	0.0
	Small Bilge Pump	Rule 500	Rare	1.9	0	0.0
	Watermaker	Katadyn 40E	2 hrs every 3 days (run when sunny)	4.0	0.7	2.7
Total Load/Day						**192.1**

			Watts	**Sunny**	**Avg**	**Cloudy**
Charge	Solar	Fly SolarTech S2 & Victron 75/15's	620	3.0	4.0	5.0
	Hydrogenerator		Needed?			
Total Renewable	**Charge per day**			206.7	155.0	124.0
Net Energy Cons	**umption, AH/Day**			**0.0**	**37.1**	**68.1**
Engine Running Time & Fuel Estimates	Desired Hours Between Charging			**24**	**24**	**24**
	Range of Battery Use	Lithium	From 20% to 95% state of charge.	**75%**	**75%**	**75%**
	Recommended Battery Capacity			**0**	**49**	**91**
	Alternator Output, Amps		What % of battery capacity?	**200**	**200**	**200**
	Charge Efficiency Factor	95%		**0.95**	**0.95**	**0.95**
	Minimum Minutes to Charge		Alternators (2) at full output.	**0**	**12**	**22**
Fuel Capacity	Gallons per hour (charging)			0.30	0.30	0.30
	Hrs per day			0.0	0.2	0.4
	Tank Capacity		5 Gallon Reserve	20.0	20.0	20.0
	Days supply in tank			**#DIV/0!**	**341.2**	**185.9**

NKE Instrument Loads

	Hrs/Day	Amps	
Multigraphic – Standby		8	0.091
Multigraphic – Day		12	0.14
Mutligraphic – Night		4	0.11
Multigraphic – Average		24	0.356
GPS Antenna		24	0.6
Speed/Log/Depth Interface			0.06
Regatta Compass			0.2
Wifi Box			0.05
Gyropilot			0.05
Remote Receiver			0.05
Carbowind			0.025
			1.391

Battery Type Analysis

Type	Brand/Size	Qty	Rated Capacity (AH)	Total Rated Capacity (AH)	Cost	DOD Range	Effective Capacity (cold weather)	Weight (Lbs)	Estimated Total Fuel Consumption (Gallons) (Party Cloudy Days) (140 Days at Sea; 0.25 Gallons/Hr)	Charge Notes	Comments	Advantages	Disadvantages
AGM	Lifeline 4D	2	210	420	$2,400	50.00%	178.5	354.5	36.3	Desulfation Engine charge for 2 hours every 7 Days	Low risk. Will need to replace at end of trip due to likely repeated cycling to 70% DOD. Cost doubled to cover. Weight includes 3 jugs exra diesel.	• Lower risk than lithium • Maintainable, simpler	• Weight • Lowest usable capacity • Need to carry jugs.
Firefly	L16 4V	3	450	450	$1,977	60.00%	229.5	353	31.3	Desulfation Engine charge for 2 hours every 14 Days	Low risk. Perhaps lowest as more resistant to sulfation & reduced capacity during trip. Should have life at end of trip. Unsure if form factor will fit space available. Weight includes 2 jugs extra diesel fuel.	• Lower risk than Lithium, • Longer life than AGMs with “abuse”, so cheaper in long run. • A little less fuel.	• Weight • Form factor • Need to carry jugs
Lithium	330-8D	1	330	330	$5,571	75.00%	247.5	115	25		Risk. Special charge setting for regulators, solar chargers. BMS reliability? Cost includes 1 battery, 2 BMS Advantage – no voltage drop with large load spike such as autopilot in heavy seas.	• 240lbs less weight is significant • Capacity • Battery life • Voltage stability	• $5,000 more expensive • More risk due to Complexity of BMS and stacks; less well understood