



SDI Review Form 1.6

Journal Name:	British Journal of Applied Science & Technology
Manuscript Number:	2014_BJAST_11152
Title of the Manuscript:	Preliminary study of an efficient OTEC using a thermal cycle with closed thermodynamic transformations.
Type of the Article	

General guideline for Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound.

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PART 1: Review Comments

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
<u>Compulsory</u> REVISION comments	None. The efficiency calculations & corresponding T-S diagrams are correct. The modelling of thermal engine producing work both during heat absorption & heat rejection is good.	
<u>Minor</u> REVISION comments	i) The reason for choosing hydrogen and helium as working fluid need to be given. ii) What depth of sea is required to have the temp gradient from 300 K to 278 K ? iii) In table no 2 (comparison with Carnot cycle) : The work done values of Carnot cycle have to be given for better understanding. It is presumed that work done values for hydrogen & helium have been calculated from equation no 7. One	i) The reason obeys to the fact that the specific heat capacity of both working fluids is very high with respect to the rest of available working fluids such for instance the nitrogen or carbon dioxide. As consequence of this selection the specific work of proportionally higher. ii) The depth required to achieve the deep sea water temperature of 278 K is about -1100 m referenced in many papers including [17]. On the other hand, to achieve a temperature of 300 K at the sea surface level, only tropical and subtropical geographic areas must be chosen. There is a lot of information regarding this topic, including but not limited to: World Ocean Atlas 2001 (one degree objectively analyzed fields and statistics), National Oceanographic Data Center, 2001; see also: http://www.nodc.noaa.gov/OC5/WOA01/1d_woa01.html; III) With respect to the table 2 folloes that according to the first law, and the T-s diagram shown in Fig 4(b) , the top temperature T3 and bottom temperature T1 are used as temperatures of an hypothetical Carnot engine. An energy balance is applicable yielding $W_i + Q_i - W_o - Q_o = 0$ The net work performed is the difference between the input and output



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	sample calculation of work done need to be given.	heat energy $W_o - W_i = Q_i - Q_o = Wn$ The efficiency of a heat engine relates how much useful work is output for a given amount of heat energy input. In general, the efficiency of a given heat transfer process (whether it be a refrigerator, a heat pump or an engine) is defined informally by the ratio of "what we get out" to "what we put in." According to Carnot, the theoretical maximum efficiency of any heat engine depends only on the ratio of temperatures within which it operates. Thus, the total amount of transferred thermal energy between the hot reservoir (heat source) and the system is $Q_i = T_3(S_3 - S_1)$ and the total amount of transferred thermal energy between the process (thermal engine) and the cold reservoir (heat sink) is $Q_o = T_1(S_3 - S_1)$ Thus, the specific work is given as $Wn = Qi - Q_o = T_3(S_3 - S_1) - T_1(S_3 - S_1) = (T_3 - T_1) * (S_3 - S_1)$ Using this expression for the specific ideal net work, table 2 has been modified by adding the corresponding results. In the same way, the thermal efficiency or Carnot factor C_F is defined to be $C_F = \frac{Wn}{Q_i} = \frac{Q_i - Q_o}{Q_i} = \frac{T_3(S_3 - S_1) - T_1(S_3 - S_1)}{T_2(S_B - S_A)} = \frac{T_3 - T_1}{T_3} = 1 - \frac{T_1}{T_3}$ As you know, Carnot's statement assumed sometimes as a theorem so far states that <i>"no engine operating between two heat reservoirs can be more efficient than a Carnot engine operating between those same reservoirs".</i> Such asseveration should be reconsidered in order to avoid some
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	iv) It has been mentioned that from same cycle -generation of potable water and running a refrigeration cycle (heat pump) is possible along with power generation. This point need to be elaborated preferably with schematic diagram.	confusion on thermodynamics fundamentals. Using equation (7) with the data of tables A1 and A2 of the appendix A the efficiency and specific work is determined in the same way as in any other thermodynamic cycle (as in the Rankine cycle for example) iv) Unfortunately due to the objectives of this paper, this paragraph “generation of potable water and running a refrigeration cycle (heat pump) is possible along with power generation” has not been mentioned in this work. However, it is an interesting topic although it is not under the scope of this paper.
<u>Optional/General</u> comments	Few lines to be added regarding scaling up of this model. For example the size of cylinders, heat exchangers, pumps etc to make a 10 MW size OTEC based power plant.	A table with the corresponding comments containing the results you suggested for a 10 MW OTEC power plant have been included at the end of the section of results. Many thanks for your valuable suggestions and help which contributes on the enhancement of the paper.