

CURRENT USE AND OPPORTUNITIES THAT EXIST TO INCREASE  
USE OF SUSTAINABLE ENERGY TECHNOLOGIES IN MICRO-GRIDS  
IN UNITED NATIONS PEACEKEEPING WITHIN THE CONTEXTS OF  
ORGANIZATIONAL REFORM AND CLIMATE CHANGE



BY  
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A THESIS PRESENTED IN PARTIAL COMPLETION OF THE REQUIREMENTS OF  
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Organizational Reform and Climate Change

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## ACRONYMS

(BRIC)	Brazil, Russia, India, and China
(CO2)	Carbon Dioxide (Greenhouse Gas Emission)
(COE)	Contingency Owned Equipment
(DoE)	U.S Department of Energy
(IIT)	Illinois Institute of Technology
(LDCs)	Less Developed Countries
(MDGs)	Millennium Development Goals
(MINUSTAH)	UN Stabilization Mission in Haiti
(MONUSCO)	UN Organization Stabilization Mission in the Dem. Rep. of the Congo
(MOU)	Memorandum of Understanding
(OPIC)	U.S. Department of Commerce's Office of Private Investment Corporation
(PKO)	Peacekeeping Operations
(SETM®)	Sustainable Energy Technologies in Micro-grids®
(TZB®)	The Zero Base®
(UN)	United Nations
(UNDPKO)	UN Department of Peacekeeping Operations
(UNEP)	UN Environmental Program
(UNGA)	UN General Assembly
(UNGM)	United Nations Global Marketplace
(UNIDO)	UN Industrial Development Organization
(UNIFIL)	United Nations Interim Force in Lebanon
(UNIKOM)	United Nations Iraq-Kuwait Observation Mission
(UNMISS)	United Nations Mission in the Republic of South Sudan
(UNMIT)	United Nations Integrated Mission in Timor-Leste
(UNOE)	United Nations Owned Equipment
(UNPD)	UN Procurement Division
(UNSG)	UN Secretary General
(UNSC)	UN Security Council
(U.S.)	United States

## ABSTRACT

In this thesis, I seek to answer questions about the use of Sustainable Energy Technologies in Micro-grids (SETM)<sup>®</sup> in United Nations Department of Peacekeeping Operations (UN DPKO), and perhaps other Peacekeeping Operations (PKO). One question is, what is the current use? Another question is, how is the UN DPKO supporting UN Millennium Development Goal (MDG) #7 without SETM? The third question motivating this research is, what opportunities exist to increase the use of SETM given MDG #7, global climate change's impact on intergovernmental policy, and the overall state of UN reform? This thesis also includes information about how less developed countries' (LDCs) participate in UN PKO and how the opportunity for LDCs to also acquire new, refurbished, and sustainable electricity generation may lead to more LDC peaceful global economic development. As LDCs membership into the developed world results from participation in and assistance from UN PKO, I explore general and specific UN policies which allow increased SETM in UN PKO; thereby allowing LDCs to contribute to UN DPKO's mandate and MDG #7.

## INTRODUCTION

We all live in a very complex world where seemingly unrelated fields of science, technology, and information meld, reflecting increased control over our natural and social environment more than we previously thought. Leading scientists and sociologists espouse how humans have the opportunity to evolve beyond conflicts attributed to man-made, industrial, fossil fuel-created climate change. Climate change droughts, floods, and storms limit the availability of scarce resources resulting in conflict. However, with inventions, innovations, and reforms of existing ideas, technologies, and governance methods of the world's people and resources, there are plenty of opportunities to repair, and in some cases, reverse the climate damage to both the environment, and help to humanity. One such opportunity to repair and reverse that damage is to use SETM in UN PKO. This thesis researches opportunities that exist to improve living conditions within UN PKO communities within the context of climate change, resulting from post conflict/post disaster energy infrastructure construction that includes SETM. A precursory description of SETM, which I will delve into much more later in this thesis, is they are reliable electricity micro-grids that use renewable energy like solar and wind power, to name a couple of many types, to provide power to stand alone and grid tied electrical infrastructures.<sup>1</sup> Explored in this research are the linkages between the latest in SETM and how the use of SETM in UN PKO help the UN DPKO reach its mandate to assist the many Member States and the Secretary-General in their efforts to maintain international peace and security.

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<sup>1</sup> "SPIDERS Industry Day Implementation Considerations", Burns and McDonnell and U.S. Department of Energy, (accessed September 1, 2013) , [http://www1.eere.energy.gov/femp/pdfs/spiders\\_implementation.pdf](http://www1.eere.energy.gov/femp/pdfs/spiders_implementation.pdf) ;

"Energy Department Partners with State of New Jersey to Study Ways to Improve the Reliability of New Jersey's Transit System in Aftermath of Superstorm Sandy", U.S. Department of Energy, August 26, 13 (accessed September 1, 2013), <http://energy.gov/articles/energy-department-partners-state-new-jersey-study-ways-improve-reliability-new-jersey-s>;

"Advancing Military Microgrids", Maurer, Eric, Rocky Mountain Institute, Electricity Innovation Lab, Boulder, CO, 1 September 2013 (accessed November 1, 2013), [http://www.rmi.org/Knowledge-Center/Library/2013-15\\_NavyReport](http://www.rmi.org/Knowledge-Center/Library/2013-15_NavyReport).

Although many countries have national SETM research programs, the United States (U.S.), the leading UN financial contributor to both the UN and the UN DPKO, has been working tirelessly on SETM since before the 2000 West Coast blackouts and the eventual northeast black and brown outs. The scale and complexity identified during the U.S. SETM trials lends well to SETM applications in UN PKO. The Galvin Center is one example of how SETM is used at the university campus level.

The Galvin Center partnered with the U.S. Department of Energy to build the first-ever Perfect Power microgrid - an electric system that will not fail - at IIT's main campus in Chicago. Beginning in 2008, this \$13 million partnership has developed the first functional smart microgrid in the country. This flagship system will confront and model - for other campus environments, municipalities, community developments, and more - a solution to the nation's energy crisis. The revolutionary smart microgrid is designed to eliminate blackouts, cut its peak load by 20 percent and integrate more distributed renewable energy resources. Major project investments include the following: Redesigning the old campus radial distribution system into a looped high-reliability distribution system equipped with smart switches for enhancing reliability; installing new distributed energy resources (roof-top solar panels, wind generation units, large scale battery systems, and charging station for electric vehicles); and creating smart buildings equipped campus, building, and sub-building energy management systems. Yearly, the grid saves the university an estimated \$1 million dollars in electricity costs and costs associated with blackouts. In addition to eliminating blackouts, the Perfect Power system can be operated as a stand-alone power system, or islanded system, in the case of grid contingencies. The Galvin Center leadership is working with entities across the world to replicate and scale the microgrid model for communities, military bases, corporate parks, sports facilities, and other universities.<sup>2</sup>

Galvin's SETM trial models are comparable to the sizes of UN PKO communities, especially within the refugee camp-sized operations settled within UN PKO. They serve as resources for

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<sup>2</sup> Shahidehpour, Mohammad, Ph.D, Bodine Distinguished Chair and Director., "What We Do, Microgrid: First Ever Perfect Microgrid", Robert W. Galvin, Center for Electricity Innovation at Illinois Institute of Technology and U.S. Department of Energy, January 1, 2012, (accessed September 1, 2013), <http://www.iitmicogrid.net/galvincenter.aspx>.

the scalability and application to UN PKO.

This thesis further focuses on major UN financial and troop contributors' motivations and influence on world decisions about SETM application through UN PKO.<sup>3</sup> This research is based on the findings about SETM use in all current UN PKO from the following sources: (1) United Nations Procurement Division; (2) responses from UN Intergovernmental Agencies interviews; (3) responses from foreign affairs practitioner interviews from the U.S. Government as the majority financial contributor; and (4) research from SETM private industry. From reviewing these resources, the evolving post conflict/disaster reconstruction use of SETM, and the potential for UN PKO increased participation in the international SETM market comes into clear view.

Additionally, discoveries about how SETM are currently being used in LDC non-UN PKO new construction suggest SETM would be well received in UN PKO in the LDCs<sup>4</sup> of the world.<sup>5</sup> An example of LDC use of SETM as an economic benefit is in Greece, with its Helios plan to “[conduct] a massive initiative to ramp up solar power production from 206 MW to 2.2 GW by 2020, and up to 10 GW by 2050.”<sup>6</sup> Günther Oettinger, European Union Commissioner for Energy stated, “Helios is a unique opportunity to demonstrate renewable energy technologies

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<sup>3</sup> “Rule 158 of the Rules of Procedure of the General Assembly”, United Nations General Assembly, Committee on Contributions, (Resolution 31/95), December 14, 1976, (accessed October 15, 2013) <http://www.un.org/en/ga/contributions/members.shtml>.

<sup>4</sup> “List of Least Developed Countries”, UN, January 1, 2014 (accessed July 18, 2014) [http://www.un.org/en/development/desa/policy/cdp/ldc/ldc\\_list.pdf](http://www.un.org/en/development/desa/policy/cdp/ldc/ldc_list.pdf).

<sup>5</sup> “Enphase Energy Announces Clinton Global Initiative 'Commitment to Action' for Nigerian Microgrid Project: Enphase and Beacon Power Services to develop microgrid pilot for clean, reliable energy in Africa”, Bennett, Christine, Business Wire, October 10, 2013, (accessed October 13, 2013), <http://www.marketwatch.com/story/enphase-energy-announces-clinton-global-initiative-commitment-to-action-for-nigerian-microgrid-project-2013-10-10>;

“Global Market Outlook for Photovoltaic, 2013-2017”, European Photovoltaic Industry Association, 2013 (accessed November 11, 2013), [http://www.epia.org/fileadmin/user\\_upload/Publications/GMO\\_2013\\_-\\_Final\\_PDF.pdf](http://www.epia.org/fileadmin/user_upload/Publications/GMO_2013_-_Final_PDF.pdf);

“Etrion and Total Secure Financing with OPIC for 70 MWp Salvador Solar Project in Chile”, SunPower Corp., December 11, 2013 (accessed December 28, 2014), <http://newsroom.sunpower.com/index.php?s=20295&item=122941>.

<sup>6</sup> “Greek Hopes Rest on Solar power for Economic Recovery”, Vijayaraghavan, Akhila, quotation by Günther Oettinger, EU Commissioner for Energy, April 9, 2012, (accessed December 15, 2014), <http://www.triplepundit.com/2012/04/greek-hopes-rest-solar-power-economic-recovery/>.

like photovoltaics are becoming competitive in the near future through European cooperation. It could be the showcase project on the way to a truly integrated European market for electricity from renewable sources, while simultaneously helping the Greek economy to recover.”<sup>7</sup> This is an example of a post conflict country which is (although not internally hosting UN PKO beyond its involvement in the UN Peacekeeping Force in Cyprus) rebuilding from the ruins of decades of poverty and national conflict, resulting in national civil police response, and infrastructure development at the level of some UN PKOs. If successful, the Helios program would be a good LDC UN Member Nation case study for UN PKO to implement SETM in reconstruction, as well as cases from the U.S. like the Galvin Center.

#### The UN System’s evolution of UN PKO and member roles

As a formal international intergovernmental organization in the history of the modern world, the United Nations (UN) is a nascent body created during World War II. The UN’s conventions, rules, regulations, resolutions, and programs are instruments of international law used by its members to uphold the UN Charter. From its outset, leading into the end of World War II, the Korea War and the Cold War, there has never been a “one government” philosophy guiding the UN’s functions, duties, or responsibilities. It consists of sovereign nations at liberty to do what they want, and to advocate for what they choose at the UN, regardless of their proportionate contributions. The UN system still operates from its humble start only 60 years after its indoctrination as an intergovernmental organization, created by the nations of the world seeking to rid the world of the scourge of war.

The UN consists of five main governing bodies (Security Council, General Assembly, Economic and Social Council, International Court of Justice, and the Secretariat), and a group of Specialized Agencies, Committees, and Conventions. The UN’s major financial contributor, the

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<sup>7</sup> Ibid.

U.S., contributes 22 percent (Table 1)<sup>8</sup> of the overall UN budget, with other developed world nations also providing to the General Fund through the Regular Scale of Assessments. For financial contributions to the UN PKO, the U.S. also leads with 28 percent (Table 2)<sup>9</sup> of the UN DPKO budget.

As the U.S. is of paramount financial and resultant political interest to the UN, it is worth noting William Shawcross

clearly states the historical position of U.S./UN relations in his 2000 book on the UN,

America had always been crucial to the development of the UN. Franklin Delano Roosevelt had not only been present at its creation, he was also in a real sense its creator.

Having served under Woodrow Wilson, Roosevelt knew how the failed peace after World War I contributed to the Great Depression and the age of the tyrants....Without Roosevelt, there would have been no UN, no Bretton Woods institutions,

Table 1

<b>United Nations Top 10 Scale of Assessments for the Apportionment of the Expenses</b>
1. United States (22%)
2. Japan (11%)
3. Germany (7%)
4. France (6%)
5. United Kingdom (5%)
6. China (5%)
7. Italy (4%)
8. Canada (3%)
9. Spain (3%)
10. Brazil (3%)
Source: <a href="http://www.un.org/ga/search/view_doc.asp?symbol=A/67/502/Add.1">http://www.un.org/ga/search/view_doc.asp?symbol=A/67/502/Add.1</a>

Table 2

<b>Top 10 United Nations Peacekeeping Operations Providers of Assessed Financial Contributions</b>
1. United States (28%)
2. Japan (11%)
3. France (7%)
4. Germany (7%)
5. United Kingdom (7%)
6. China (6%)
7. Italy (4%)
8. Russia Federation (3%)
9. Canada (3%)
10. Spain (3%)
Source: <a href="https://www.un.org/en/peacekeeping/operations/financing.shtml">https://www.un.org/en/peacekeeping/operations/financing.shtml</a>

<sup>8</sup> “Sixty-seventh Session of the United Nations, Scale of Assessments for The Apportionment of the Expenses”, UN GA, 67/238, Resolution adopted by the General Assembly on December 24, 2012, Report of the Fifth Committee [A/67/502/Add.1], December 24, 2012, (accessed on November 11, 2013). [Table #1 created by author from data from UN GA] [http://www.un.org/ga/search/view\\_doc.asp?symbol=A/67/502/Add.1](http://www.un.org/ga/search/view_doc.asp?symbol=A/67/502/Add.1).

<sup>9</sup> Providers of Assessed Contributions to United Nations Peacekeeping Operations in 2013”, UNDPKO, <https://www.un.org/en/peacekeeping/operations/financing.shtml>, (accessed January 15, 2014). [Table #2].

no General Tariffs and Trade, no World Health Organization, Food and Agricultural Organization, UN Educational, Scientific and Cultural Organization, or any of the permanent international organizations.”<sup>10</sup>

The rich U.S./UN relationship is born from the many sacrifices made by the organization as a whole and made by individual member countries in joint member nation UN DPKO operations. Regardless of any predominant sacrifices by individual members, objectivity in leadership is maintained by the organization as a whole to serve all member nations equally.

UN DPKO is under the immediate control of the Secretary General (UNSG) to ensure most direct adherence to the UN mandate. The UNSG through the UN DPKO created a database of countries participating in UN PKO. UN DPKO also selects key leaders to manage PKOs. This immediate access to decision making leadership is an important factor in realizing the opportunities to implement SETM in UN PKO. Because the leading UN PKO troop contributors have been from LDCs since the original UN PKO in 1948, many leaders learn to reduce tensions in countries prone to conflicts. As those LDCs struggle for development, they also compete to join developed world markets.

The UN DPKO has been a very important leader in the raising of LDC's status into the developed world. The Republic of Korea (ROK) for example is a good representation of such development. As a former Joint Service Member of the United Nations Command-Military Armistice Commission (UNC-MAC) located in ROK, I truly can state there are UN military personnel maintaining peace on the peninsula through the original intent of the UNC-MAC mission. Moreover, it should be said that the current UNSG is from ROK, Mr. Ban, Ki-moon. His rise to that office is because of his leadership and his country's vehement acceptance of UN member nations' responsibilities to the organization and their unending desire to participate in accordance with everything the DPKO mission generally represents.

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<sup>10</sup> William Shawcross, *Deliver Us From Evil*, (New York: Touchstone, Simon and Schuster, 2000), 225.

The LDC to UN DPKO relationship may seem challenging at times. Those challenges exist; however, the UN DPKO works hard to maintain ethical measures that ensure LDC troop contributing countries to UN PKO are directly not politically or economically tied to the conflicts in which they serve as peacekeepers. Discussed further in this thesis are the economic energy related factors that are increasingly the causes of fostering the LDC status. Again, the LDCs are also the most frequently struggling countries in search of buying and selling energy resources on the developed world market, and therefore would benefit the most from the introduction of SETM, both into their countries, and within the UN PKO missions. At stake are large budgets and UN Member national economic plans upon the successful outcomes of LDC billeted UN PKO. The UN DPKO must maintain objective and ethical foundations as it builds its PKO.

When comparing the regular UN budget to the UN Peacekeeping budget, the UN DPKO manages more funds (est. USD7.5B<sup>11</sup>) than the UNSG manages (est. USD2.6B<sup>12</sup>). The basic funding for peacekeeping and peace enforcement operations are reimbursements to nations providing peacekeeping logistical and sustainment aspects, focused on Contingency Owned Equipment (COE) system, the UN Procurement Division (UNPD), and its United Nations Global Marketplace (UNGM) online vendor registration system. These UN system programs are critical to introducing new ideas through the UN DPKO, to countries in conflict.

The COE and UNPD, as described on the UNPD website is as follows: “The UNPD conducts procurement for the UN Headquarters in New York, Peacekeeping/Political Missions, Tribunals and Commissions. Selected offices away from Headquarters do have delegated

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<sup>11</sup> Ibid, Table #2.

<sup>12</sup> “Assessment of Member States’ advances to the Working Capital Fund for the biennium 2014-2015 and contributions to the United Nations regular budget for 2014”, UN Secretariat, December 27, 2013, (accessed January 15, 2014), [http://www.un.org/ga/search/view\\_doc.asp?symbol=ST/ADM/SER.B/889](http://www.un.org/ga/search/view_doc.asp?symbol=ST/ADM/SER.B/889).

procurement authority to carry out their own procurement up to established financial limits. The UNPD generally conducts purchases beyond these limits and for global acquisition projects.”<sup>13</sup> The details of the ground level procurement process are located online and its system becomes more transparent for LDCs. Thus, communications technology improvements reach LDCs. The key for realizing the opportunities that exist for SETM in UN PKO is the ‘global acquisition’ portion of the above mentioned procurement policy. The global acquisition factor will allow for the broadest distribution of SETM within LDCs. Moreover, the UNPD might seize the opportunity to work with the UNSG to establish a SETM fund as a ‘project’, which is language used in UNPD policy on its website. With UNSG political oversight of UN PKO, realizing the opportunities yielded from UNPD processed SETM for UN PKOs as a special ‘project’ is a promising possibility.

UN PKO are normally found in LDCs lacking energy resources. Introducing additional requirements for power and water in remote locations, and on already disadvantaged regions, is a significant operational obstacle that could be overcome with SETM projects. Sustaining procurement and logistics for SETM in UN PKO is easily done with traditional sea/air/ground shipments of boxes from major sea and airports. The shipments are of chemically stable and inert material; or more simply stated, sand-based plastics, and steel. Using SETM is in stark contrast to current energy program that rely solely on fossil fuels. The alternative costs of SETM shipments are minimal and a fraction in comparison to fossil fuel systems. Perhaps the UNSG’s oversight would be better received by troop contributing LDCs when they realize improved costs associated with SETM. These logistics and procurement reforms, if realized, could save lives, help meet budgets, and help meet PKO mission goals through focusing on SETM use.

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<sup>13</sup> “Frequently Asked Questions”, United Nations, Procurement Division Website, (accessed July 3, 2014), <http://www.un.org/depts/ptd/faq.htm>.

## UN reform with SETM as potential catalyst

As reform has been a special UN focus for at least two decades, UN PKOs undergo close scrutiny with that reform in mind. Within UN reform, the UN focuses on three main aims based on its platform for international action which cumulatively ‘strengthens the UN’. Those aims are: “Delivering Results; Doing More with What We Have; and Strengthening Accountability”.<sup>14</sup> Those aims are of central concern to the UN and to the U.S. as the largest contributor. That being said, the UNSG and UN DPKO may choose the opportunity to apply SETM as a reform factor.<sup>15</sup>

This period of UN reform provides additional value to the UN and its member nations beyond its majority contributors’ interests. The UN also improves reform by more vehemently supporting the UNGA MDGs, specifically MDG #7 (ensure environmental sustainability). These MDGs are the major set of policy guiding principles overarching the UN reform movement, and daily UN operations in general. Use of SETM in UN PKO directly supports this MDG. UN Member Nations are more apt to ensure environmental sustainability for their citizens with the tandem development of increasing their nations’ industrial stakes and uses of SETM technologies nationally<sup>16</sup> as a result of increased use in UN PKO, both in their countries, and in countries in which their troops serve in UN PKO. The exposure to SETM through those avenues will train, equip, and educate LDC members who might otherwise not have had the exposure to SETM. UN Member Nations’ leaders would be well suited to create change in support of MDG #7; especially when those changes reflect the parts of the whole.

UN leadership for implementing the reform of using SETM is critical. It is apparent the

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<sup>14</sup> “Strengthening the UN”, United Nations, (accessed July 5, 2014), <http://www.un.org/en/strengtheningtheun>.

<sup>15</sup> Ibid.

<sup>16</sup> “Staff China Pushes Back at US Solar Complaint as Trade Dispute Heats Up”, Business Green, October 22, 2011, (accessed December 14, 2013), <http://www.greenbiz.com/news/2011/10/22/china-pushes-back-us-solar-complaint-trade-dispute-heats?page=full>.

U.S. leads the UN reform movement. It leads by upholding MDGs, including #7, with direct support from the U.S. Department of State; with theoretical U.S. Institute of Peace support via its Guiding Principles, Fundamentals of Comprehensive Approach, 5.7, ‘nesting’;<sup>17</sup> and with indirect U.S. military field operational use and testing support of SETM.<sup>18</sup> Although U.S. leadership is evident in general UN support, specific SETM support in UN PKO is not prevalent at this time. In seeking to identify opportunities for increased SETM use, I posed related questions to a leader in the U.S. Department of Defense, Secretary of Defense’s office for the Under Secretary of Defense, Acquisitions, Technology and Logistics for Operational Energy Plans and Programs. That office works with operational energy environments across the U.S. government, including other agencies that support UN PKO. The energy policy official stated U.S. interagency efforts for SETM in UN PKO are just starting<sup>19</sup>, indicating the work ahead is substantial, but it is within approach. U.S. leadership has helped the UN reform movement and is now poised to move ahead on SETM use as a means of achieving some of those reform and MDG objectives<sup>20</sup>.

The UN might seize the political opportunity to collaborate with its most major financial contributor, the U.S, for increased use of SETM with UN reform in mind. Also, the UN might look politically inward for opportunities to use SETM as a reform tool. The lack of internal UN support for SETM use is evident. The UNSG special report from the UN Industrial

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<sup>17</sup> “Guiding Principles for Stabilization and Reconstruction”, U.S. Institute of Peace and U.S. Army Peacekeeping and Stability Operations Institute, Endowment of the United States Institute of Peace, Washington, D.C., pg. 40, 2009, (accessed in September 21, 2013), [http://www.usip.org/sites/default/files/guiding\\_principles\\_full.pdf](http://www.usip.org/sites/default/files/guiding_principles_full.pdf).

<sup>18</sup> ‘Engineers Bring Light to Fallujah’, Harris, Scott, American Forces Press Service, January 13, 2010 (accessed November 17, 2013), <http://www.defense.gov/news/newsarticle.aspx?id=57478>.

<sup>19</sup> Undisclosed source, United States Department of Defense, Office of the Secretary of Defense, Acquisition, Technology and Logistics, Office of Operational Energy, Email interview, Pentagon, Arlington, VA, 2013.

<sup>20</sup> Ibid.

Development Organization on *Sustainable Energy for All* (SEA)<sup>21</sup> recommended significant SEA programs or project activities to improve UN DPKO use of energy efficiency programs. Some initial UN DPKO reforms with SETM were evident in a very recent meeting between UNSG Ban and U.S. Secretary of Defense Hagel in mid-April 2014. That meeting yielded political support for the formation of an Expert Panel on Technology and Innovation in UN Peacekeeping,<sup>22</sup> wherein high level panel representatives from U.S., India, South Africa, Holland, and Canada will work to improve the use of new and emerging technologies in UN PKO. This is a good example which is telling of future opportunities to increase the use of SETM in UN PKO, as it is an emerging technology when potentially applied to UN PKO. These high level appointees can additionally facilitate MDG #7 on behalf of UN member nations to supplement SEA with global approaches to match U.S. efforts and support.

UN reform discussions continue to evolve as Brazil (1995), Russia (2012), India (1995), and China (2001) (BRIC) relatively recently joined the World Trade Organization. The BRIC nations are increasingly competing and leading the world SETM marketplace because of LDC access to BRIC nation markets.<sup>23</sup> BRIC nations have shown greater manufacturing levels of SETM than other UN DPKO majority contributing nations as they coalesce with the UN International Panel on Climate Change agreements to reduce Co2 emissions.<sup>24</sup> However, despite

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<sup>21</sup> “Pathways for Concerted Action: A Global Action Agenda”, UN Industrial Development Organization, The UN Secretary-General’s High-Level Group on Sustainable Energy for All, April 2012, (accessed October 19, 2013) <http://www.un.org/wcm/webdav/site/sustainableenergyforall/shared/Documents/SEFA-Action%20Agenda-Final.pdf>

<sup>22</sup> “Expert Panel on Technology and Innovation in UN Peacekeeping”, UN Under Secretaries Generals for DPKO and DFS, June 4, 2014,(accessed July 5, 2014), [http://www.un.org/en/peacekeeping/documents/Expert-Panel\\_Technology-Innovation\\_UNPeacekeeping.pdf](http://www.un.org/en/peacekeeping/documents/Expert-Panel_Technology-Innovation_UNPeacekeeping.pdf).

<sup>23</sup> “China Explore Potential Solar Market, Invests \$6B in Pakistan: LDK Solar, Yingli Green Energy, ReneSola, Suntech Power, JA Solar, JinkoSolar, Canadian Solar, SunPower, KB Home, Suntech Power”, Beal, John, July 26, 2013, (accessed November 11, 2014), <http://www.propertymentorgroup.com/solar-stocks-cheers-on-china-explore-potential-solar-market-invests-6b-in-pakistan-ldk-solar-yingli-green-energy-renesola-suntech-power-ja-solar-jinkosolar-canadian-solar-sunpower-kb-home/128512> .

<sup>24</sup> “BRICS pledge cooperation on climate change”, Xinhua, September 17, 2013, (accessed September 28, 2014), [http://news.xinhuanet.com/english/world/2013-09/17/c\\_132725951.htm](http://news.xinhuanet.com/english/world/2013-09/17/c_132725951.htm).

this global BRIC SETM market activity, the use of SETM in UN PKO proportionately has not increased.

#### UN DPKO contributors' roles and communication in Climate Change conflicts

Studies show all nations must act now to significantly reduce or remove their Co2 emissions. These emissions cause climate change with increasing regularity and with ever nearing deadlines to find solutions.<sup>25</sup> Failure to reduce emissions may result in global climate catastrophes, including conflicts over increasingly diminishing resources. With BRIC and LDCs reaching new levels of economic industrial prosperity, with increased levels of climate change, the need for leadership to include SETM in UN PKO becomes more evident. Answering the call for that leadership is the United Nations Environmental Program (UNEP). The UNEP is an instrumental organization involved in every level of climate and environmental assessment, evaluation, and programmatic response to climate change. A recent joint research and publication project was released by the UN focusing on UN DPKO and UNEP missions. The report addressed a component of SETM, solar energy. The UNEP publication *Greening the Blue Helmets* states, "Several missions use photovoltaic solar units on a limited scale, including UNIFIL, UNMIT, MINUSTAH, and MONUSCO."<sup>26</sup> The difference in overall sustainability and public health between the use of fossil fuels and SETM in reconstruction was also noted in the 2005 UNEP Assessment of the Environment in Iraq; wherein, it was discovered the use of fossil fuels during conflict and disaster reconstruction leads to exacerbated environmental problems that exponentially delay recovery, prolong development, and exacerbate fossil fuel

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<sup>25</sup> "Polar ice sheets 'are melting three times faster than they were just two decades ago", Daily Mail reporter, November 30, 2012, <http://www.dailymail.co.uk/sciencetech/article-2240917/Polar-ice-sheets-melting-times-faster-just-decades-ago.html#ixzz36EciFUjG>.

<sup>26</sup> "Greening the Blue Helmets," United Nations Environment Program, May 31, 2012, (accessed November 24, 2013), pg. 29, [http://www.un.org/en/peacekeeping/publications/UNEP\\_greening\\_blue\\_helmets.pdf](http://www.un.org/en/peacekeeping/publications/UNEP_greening_blue_helmets.pdf).

production related health problems.<sup>27</sup> Additionally, an energy specialist for the UN Office of Field Support working with the UNEP noted in an email interview, “it [solar added to a traditional fossil fuel burning generator set] took five years to be embraced by the technical personnel of the UN DPKO Field Missions.”<sup>28</sup> Five years is a very long time and not an operational time frame to realize the overall paradigm change which might otherwise take place. After a survey of all active UN PKO, only one response related to SETM was discovered. These results clearly convey there are significant opportunities to increase the use of SETM.

The U.S. is at the center of the climate change reality. From its global leadership, the U.S. stresses, with BRIC nations, a decrease in CO<sub>2</sub> emissions. At the same time, the U.S. is center stage calling for UN reform. SETM use in UN PKO promotes the use of SETM globally at the ground level. Its use will help alleviate man made climate change, thereby reaching MDG#7 to a greater extent than by burning fossil fuels. A U.S. research group stated, “Global warming is unequivocal and primarily human-induced. Global temperature has increased over the past 50 years. This observed increase is due primarily to human-induced emissions of heat-trapping gases [i.e. CO<sub>2</sub> emissions from the burning of fossil fuels].”<sup>29</sup> The U.S., for the moment, chooses to lead the overall global energy market with natural gas and oil exports, not SETM.<sup>30</sup> UN member nations have the opportunity to request the U.S. turn its position as world leader for fossil fuel exports to becoming a world leader of SETM exports to LDCs. That leadership role might be accomplished by building SETM markets through UN PKO, LDC post

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<sup>27</sup> “Assessment of Environmental “Hot Spots” in Iraq”, United Nations Environmental Program, pgs. 13-14, 2005, (accessed December 28, 2013),

<http://www.unep.org/Documents/Multilingual/Default.asp?DocumentID=468&ArticleID=5029&l=en>.

<sup>28</sup> Mushumbusi, Bennie M, Energy Specialist, UN Office of Field Support, email interview with author, mushumbusi@un.org, October 21, 2013.

<sup>29</sup> “Global Climate Change Impacts in the United States” Karl, Thomas R., Melillo, Jerry M., and Peterson, Thomas C., (eds.), Cambridge University Press, 2009, (accessed November 16, 2013), <http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf>.

<sup>30</sup> “U.S. surges past Saudis to become world's top oil supplier”, October 15, 2013, (accessed October 19, 2013), Reuters, <http://www.reuters.com/article/2013/10/15/us-oil-pira-idUSL1N0151IX20131015>.

conflict/disaster reconstruction assistance and education. Justin Guay supports LDCs building their economies with SETM, and stated about the World Bank,

While clean energy growth alone would justify the transition beyond coal, the truth is it also fails the other central mission of developmentally minded institutions – it won't end energy poverty. A report released in 2011 by the International Energy Agency outlined how the world could achieve universal energy access. Its findings? 70 percent of rural areas world wide – where the vast majority of the 1.3 billion un-electrified live – need decentralized clean energy not coal. It also found that 64 percent of total additional investment needed to achieve this goal must flow to decentralized clean energy [distributive microgrids]. So whether it's the centralized grids of the 20th century or the decentralized grids of the 21st century, the future is renewable.<sup>31</sup>

As the U.S. is the major UN financial contributor, and as the U.S. is lagging behind BRIC nations in SETM manufacturing and export, a UN/U.S./BRIC environmento-economic paradigm is developing with SETM competition as the central solution. The stage is set for a BRIC/LDC/U.S. agreement to fight climate change and reduce conflicts by using SETM.

U.S./BRIC compete for fossil fuel energy resource extraction and export markets. Their competition is not without indirect negative economic conflicts which evolve into conflicts amongst dependent LDCs. LDC conflicts result as they express their interests in participating in the global community and global market, with developed countries as role models. LDCs' interest for participation is expressed via their stake in extraction and marketing of their energy resources in developed world markets. Those interests eventually evolve into needs when the LDCs move beyond their agricultural identities to create new global fossil fuel market derived national identities.<sup>32</sup> The result can be seen in conflicts with increased UN DPKO intervention in

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<sup>31</sup> "World Bank abandons coal, green light for clean micro-grids" Guay Justin, July 14, 2013, (accessed November 17, 2014), <http://reneweconomy.com.au/2013/world-bank-abandons-coal-green-light-for-clean-micro-grids-59247>.

<sup>32</sup> "Peacekeeping and International Conflict Resolution", Peace Operations Training Institute, Correspondence Course Module, pg 7, January 2013, (accessed December 28, 2013),

the form of UN PKO. The *Foreign Policy*<sup>33</sup> magazine and the *New York Times*<sup>34</sup> both reported on December 23, 2013, energy conflicts are occurring in South Sudan with a UN PKO (UN MISS) trying to resolve the conflict. It is with a pervasive sense of responsibility U.S./BRIC respond to LDCs conflicts through the UN DPKO.

University of California, Los Angeles Professor Michael Ross states,

...oil-producing states make up a growing fraction of the world's conflict-ridden countries. They now host about a third of the world's civil wars, both large and small, up from one-fifth in 1992. According to some, the U.S.-led invasion of Iraq shows that oil breeds conflict between countries, but the more widespread problem is that it breeds conflict within them.” He continues, “... oil both exacerbates latent tensions and gives governments and their more militant opponents the means to fight them out. Governments that limit corruption and put their windfalls to good use rarely face unrest. Unfortunately, oil production is now rising precisely in those countries where wise leadership is often in short supply. Most of the new energy-rich states are in Africa (Chad, Côte d'Ivoire, Mauritania, Namibia, and São Tomé and Príncipe), the Caspian basin (Azerbaijan, Kazakhstan, and Turkmenistan), or Southeast Asia (Cambodia, East Timor, Myanmar, and Vietnam). Almost all are undemocratic. The majority are very poor and ill equipped to manage a sudden and large influx of revenues. And many also have limited petroleum reserves -- just enough to yield large revenues for a decade or two -- which means that if they succumb to civil war, they will squander whatever chance they had of using their oil windfalls to escape from poverty.”<sup>35</sup>

Ross unequivocally describes the direct link between the use, exploration, and export of LDC fossil fuels, and resulting LDC unrest and hostilities that have traditionally resulted in UN DPKO involvement. Avoiding conflict by treating conflict before it starts through the

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[http://cdn.peaceopstraining.org/course\\_promos/picr/peacekeeping\\_and\\_international\\_conflict\\_resolution\\_english.pdf](http://cdn.peaceopstraining.org/course_promos/picr/peacekeeping_and_international_conflict_resolution_english.pdf)

<sup>33</sup> “Drill Down” Johnson, Keith, *Foreign Policy*, December 2013, (accessed December 28, 2014),

[http://www.foreignpolicy.com/articles/2013/12/23/south\\_sudan\\_violence\\_oil](http://www.foreignpolicy.com/articles/2013/12/23/south_sudan_violence_oil) .

<sup>34</sup> “U.N. Chief Urges Steps to Calm South Sudan’s Growing Conflict”, Kulish, Nicholas, and Gordon , Michael R. and Somini Sengupta, *New York Times*, Nairobi, Kenya, December 23, 2013, (accessed December 28, 2014)

<http://www.nytimes.com/2013/12/24/world/africa/turmoil-in-south-sudan.html> .

<sup>35</sup> “Blood Barrels: Why Oil Wealth Fuels Conflict”, Ross, Michael L., *Foreign Affairs*, May/June 2008, (accessed December 28, 2013), <http://www.sscnet.ucla.edu/polisci/faculty/ross/BloodBarrelsFA.pdf>.

introduction of SETM within UN DPKO is an opportunity to more humanely welcome those nations into the global marketplace. Instead of speculating on the least risk for local resource driven LDCs to reap the rewards of their fossil fuels, with UN PKO standing by to repair the damage, it is clear opportunities for preventative climate change action (thereby reducing conflict) exist when planning for the use of SETM instead of fossil fuels.

It is evident the answer to moving the SETM market forward is for LDCs to hold an increasingly larger stake in SETM use. LDCs' increasing desire to gain a larger global SETM stake could be seen as a natural historical progression as the world continues to transition from the Cold War Era which was chiefly controlled by major UN member powers with analog systems powered by fossil fuels. Those major UN global powers are now more conscious about the energy resources they use to power their increasingly digital systems. Many LDCs were supported by a "big brother" for engagement in trade and to sell their natural fossil fuel resources for manufacturing to China, the U.S., or the Soviet Union during the Cold War era. Now, LDCs are autonomous enough to compete in the open global economy or global village, wherein they offer their fossil fuels. Newly achieved LDC autonomy however has given rise to many LDC conflicts. Often these conflicts elicit UN intervention. Mr. Muzaffer Ercan Yilmaz confirms this concept in 2007 in his journal article from the *International Journal of World Peace*, "To be sure, from May 1988, when the Cold War was coming to its end, to the present day [circa 2007], there have been 47 conflicts in which the United Nations intervened...."<sup>36</sup> Such conflicts have resulted in the increase of LDC origin UN PKO since the end of the Cold War.

When LDC's gain wealth, what models and established norms of development do they have to maintain peace as the new wealth sparks internal and regional conflicts from competition

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<sup>36</sup> Muzaffer Ercan Yilmaz, "Intra-State Conflicts In The Post-Cold War Era", *International Journal on World Peace*, Vol. 24, No. 4, 11-33, (2007), 12.

over that newly acquired wealth? Increases of UN DPKO opportunities to introduce SETM in fossil fuel and climate change related conflicts are widely supported by minority UN DPKO contributing LDCs, and are in the majority UN DPKO contributors' best interests. Broadly speaking, the late Honorable Ambassador Richard Holbrooke said, "A world without the United Nations or with a paralyzed United Nations would be far more costly to all of us and far more dangerous to peace and stability."<sup>37</sup> More specifically, Ms. Madeline Albright, Former U.S. Secretary of State also portrayed the UN's value to LDCs who participate in UN PKO via contributing UN salaried troops, "This serves our interests because when the U.S. intervenes alone, we pay all the costs and run all the risks. When the UN acts, we pay a quarter of the costs and others provide the vast majority of the troops."<sup>38</sup> Not only are those troops paid, but following the operation, those troop contributing countries develop legitimate stakes in their countries' market positions on the world stage, build trade networks, take the opportunity to establish benchmarks for democratic governance, and exchange cultures towards peaceful understanding.

The importance of LDC UN DPKO acceptance cannot be overstated. Moreover, it is not argued amongst LDCs that UN PKO are essential to maintaining and developing world stability. This acceptance is further evident through their financial and troop contributions noted in the August 2014, Table 3.<sup>39</sup> Also, it is generally accepted amongst LDCs that troop and finance contributing countries provide UN PKO goods and services to LDCs that are inherently in the

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<sup>37</sup> Richard C. Holbrooke, United States Permanent Representative to the United Nations, Statement before the UN 5th Committee, USUN Press Release #40(00), New York, March 23, 2000, (accessed November 16, 2013), <https://groups.yahoo.com/neo/groups/tionghoa-net/conversations/topics/2397>.

<sup>38</sup> Linda Fasulo, *An Insiders Guide to the UN*, (Yale University Press, New Haven and London, 2004), pg. 41-42 2004.

<sup>39</sup> "Ranking of Military and Police Contributions to UN Operations", United Nations, Data Dash Board, 2014 (accessed September 11, 2014), <http://www.un.org/en/peacekeeping/resources/statistics/contributors.shtml> .

best interest of those LDC countries.<sup>40</sup> This relationship reflects the core utility of the UN and re-defines ‘big brother’ as a truly humane and universally accepted concept, not as the Orwellian manifestation of ‘Big Brother’ paranoia it personified during the Cold War.

Big brother, in this case, actually provides stability and a path for LDCs to realize MDGs as they confront the occasional conflict from neighboring regional partners seeking resources for economic development. The framework for building peace in this case is

Table 3

**Ranking of Military and Police Contributions to UN Operations**



Month of Report : 31-Aug-14

Country	M	F	Totals
1 ) Bangladesh	8254	201	8,455
2 ) India	7955	149	8,104
3 ) Pakistan	7931	22	7,953
4 ) Ethiopia	7368	484	7,852
5 ) Nepal	5075	116	5,191
6 ) Rwanda	4499	136	4,635
7 ) Nigeria	2770	200	2,970
8 ) Ghana	2652	272	2,924
9 ) Senegal	2826	38	2,864
10 ) Egypt	2540	0	2,540

Source: <http://www.un.org/en/peacekeeping/resources/statistics/contributors.shtml>

well developed and can offer more prosperity to LDCs who will soon consume increasingly larger shares of the global energy market than during the Cold War. Although LDCs may sell their fossil fuels, they can set an example on efficient use of energy. A recent report by a group of economists in the *Journal of Economic Perspectives* stated the scenario as follows:

Over the next 25-30 years, nearly all of the growth in energy demand, fossil fuel use, associated local pollution, and greenhouse gas emissions, is forecast to come from the developing [LDC] world. The U.S. Energy Information Administration reports that energy consumption in OECD and non-OECD countries was roughly equal in 2007, but from 2007 to 2035, it forecasts that energy consumption in OECD countries will grow by 14 percent, while energy consumption in non-OECD countries will grow by 84 percent.<sup>41</sup>

As humanity’s peaceful and environmentally sound development and stability are the main objectives for realizing MDG #7, communicating the opportunities for the use of stable,

<sup>40</sup> H. E. Steve D. Matenje, S. C, Ambassador And Permanent Representative Of The Republic Of Malawi To The United Nations, On The Comprehensive Review Of The Whole Question Of Peacekeeping Operations In All Their Aspects, Statement to the United Nations Fourth Committee, October 28, 2009, (accessed October 26, 2013), <http://www.un.int/wcm/webdav/site/malawi/shared/documents/On%20Peacekeeping%20operations.pdf>.

<sup>41</sup> Gertler, Paul and Shelef, Ori and Wolfram, Catherine “How Will Energy Demand Develop in the Developing World?” *Journal of Economic Perspectives*, Vol. 26, No. 1, (Winter 2012), 119-138.

safe, and healthy SETM to LDCs significantly contributes to that realization. Through more effectively communicating to LDCs the environmental, economic and public health benefits of SETM CO<sub>2</sub> emission sequestration, SETM will exponentially proliferate. The UN, in collaboration with the International Agency for Research on Cancer and World Health Organization, recently announced conclusive studies that show outdoor air pollution (ie. carbon dioxide emissions) created by fossil fuel burning is a leading cause of cancer<sup>42</sup> and other mass cardiopulmonary and communicable diseases. Fossil fuel use obviously contributes to the instability of humanity, degrades the quality of life, and its legitimacy has been tested and argued for decades. The UN's most recent announcement has been surrounded by and has been the source of contention between the fossil fuel industry and SETM proponents. Such contention has led to much under/miscommunication and misinformation campaigns by those who refuse to make the transition from fossil fuel use to SETM.

Conversely, the overwhelming majority of Climate Change observing scientists,<sup>43</sup> scholars, and physicians have been accurately communicating the reality of the negative impacts of fossil fuel burning pollution and the need for the use of SETM for over 30 years. Ross Gelbspan very clearly reinforces the impacts in his book 16 years ago,

In January 1996, a report in the *Journal of the American Medical Association* indicated there is a correlation between climate change and the spread of infectious disease.... And, in July 1996, a panel of the World Health Organization, and the UNEP released a report warning that the impacts of climate change so threaten human health that 'we do not have the usual option of seeking definitive empirical evidence before acting. A wait-and-see approach would be imprudent at best and nonsensical at worst.... Most

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<sup>42</sup> "Outdoor air pollution a leading cause of cancer, say UN health experts", United Nations News Center, October 17, 2013 (accessed October 19, 2013), <http://www.un.org/apps/news/story.asp?NewsID=46276&Cr=&Cr1=#.UmRIBpnD-M8>.

<sup>43</sup> "Consensus: 97% of climate scientists agree", U.S. National Aeronautics and Space Administration, (accessed June 14, 2014), <http://climate.nasa.gov/scientific-consensus>.

alarming, the average incidence of hemorrhagic dengue—just over 100,000 cases a year worldwide between 1981-1985—quadrupled between 1986-1990, averaging to more than 450,000 cases a year.<sup>44</sup>

As communication technologies (ie. Internet, Cellular/mobile phones) evolve and reach LDCs, even on antiquated and obsolete electricity and communications grids, LDCs will better understand how developed countries live a more humane and healthy existence with the increased use of SETM. Consequently, from LDCs' desire to live a more humane existence, LDCs will desire more modern communications devices and SETM to power them. Naturally, the advancement of these LDC economies is dependent upon technologies created in the developed world.

The interrelated and technical nature of this communication problem is evident but somewhat complex. As SETM is used in LDC UN PKO to enable more effective democratic governance and to realize MDG #7; currently, such freedoms are presented to LDCs via outdated and ill-equipped energy and communications networks. Wherein LDCs see MDGs as desirable to attain comparable developed world stability, when those MDGs are ill-communicated because of lack of SETM infrastructure, LDCs do not draw the intended correlation of a need to implement MDGs to reach what they inevitably perceive as a fictionally improved level of stability and development. An available opportunity to offer resolution to this complex energy communication problem has been answered by the energy and information industries of the developed world, SETM. The developed world has a great opportunity to introduce those technologies to LDCs.

Several developed nations have increasingly been building SETM into their existing electricity infrastructure to improve and meet their communication technology needs.<sup>45</sup>

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<sup>44</sup> Ross Gelbspan, *The Heat is On: The Climate Crisis-The Cover-up-The Prescription*, (Cambridge, Massachusetts, Perseus Books, January 1998) 147-149.

Including LDCs in this implementation of SETM is a natural progression in UN developed nations' roles. When LDCs are sold outdated and obsolete electricity technology wholly dependent upon scarce resources (ie. fossil fuels), which have already been determined to have reached the point of economic diminishing returns in the world energy market (ie. peak oil), consequent LDC conflicts often swell. This swell risks spilling the conflict into regional conflicts, which threaten global security.<sup>46</sup> Currently, UN DPKO is reactive. The opportunity is present for the UN to consider a more proactive approach with SETM. Such efforts may lead to more peace.

### SETM and the state of the technology market

Although SETM could be best applied in UN PKO at the neighborhood and refugee camp level, Figure 1 provides a visual

concept how microgrids are constructed and may be applied to as small an area as a city block.

Linking houses together on a small electric substation, SETM can also

be applied to satisfy the needs of densely populated and large geographic areas by linking individual smaller SETM substation supported energy islands (see Figure 2) to larger existing power grids. The larger application would require updated interconnection technology to accept next generation smart technologies into existing outdated power grids for routing, monitoring,

Figure 1



Source: Sierra Club <http://www.sierraclub.org/sierra/201307/innovate-microgrids.aspx>

<sup>45</sup> “Increased Use of Renewable Energy Sources in Wireless Communications Networks”, Kwasinski, Alexis, presentation to Cockrell School of Engineering, University of Texas at Austin, January 2014, (accessed February 15, 2014), <http://www.apec-conf.org/wp-content/uploads/2014/03/IS1-2-2.pdf>.

<sup>46</sup> Author’s note: Iran’s, North Korea’s and Cuba’s antiquated and obsolete power infrastructures; whose leaders not only burn fossil fuels, but who are attempting to become autonomous atomic states, in violation of UN anti-nuclear proliferation treaties, to provide power to replace oil imports with alleged ulterior motives to produce atomic weapons.

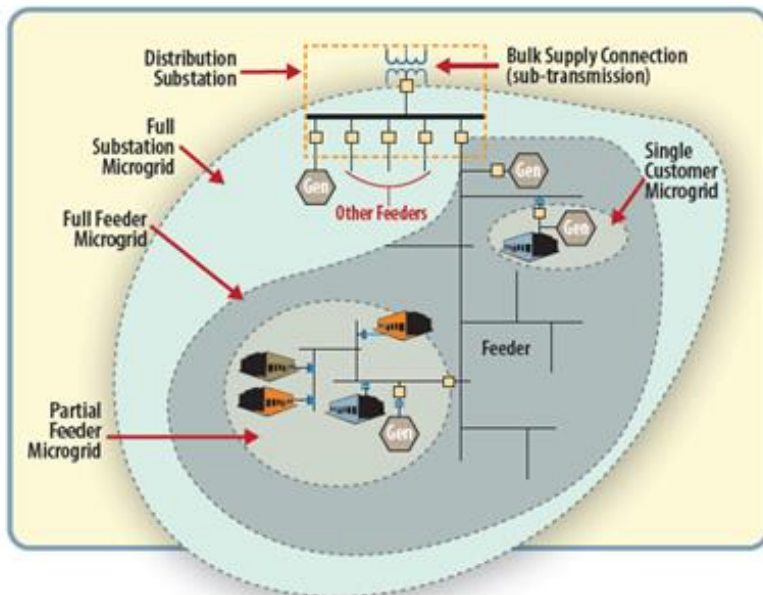


Figure #2

and maximizing the efficiency of electric transmission.

Interconnectivity technologies are readily available and primed for use in real-world and testing applications.<sup>47</sup> Both scale sizes of these cases are widely accepted as the latest

sustainable and renewable

resources, and exponentially pose fewer health risks than fossil fuels within reconstruction/relief efforts and in daily normal living conditions.  
 Source: Sandia National Laboratory [http://energy.sandia.gov/?page\\_id=819](http://energy.sandia.gov/?page_id=819)

After visualizing the state of the technology available in SETM design, one must consider the market behind SETM which can be resourced for UN PKO. The UN DPKO would be well provided with electricity generation resources with the level of efficiency and resilience of the latest SETM devices available on the market, and in the prototype stage. The United States is a leader in SETM research and development of SETM use in conflict and contingency operations during post disaster/conflict reconstruction.<sup>48</sup> Additionally, there are many foreign entities whose contributions towards the use of SETM in UN PKO would be well partnered.

There are literally thousands of international research institutes and startup companies leading the SETM market in its development. However, a few companies stand out when considering the subject matter of this thesis. A U.S. company, The Zero Base ® (TZB), is a

<sup>47</sup> “Microgrids: Very Expensive, Seriously Necessary”, Ferris, David, *Forbes Magazine*, July 31, 2013, (accessed November 10, 2013), <http://www.forbes.com/sites/davidferris/2013/07/31/microgrids-very-expensive-seriously-necessary>.

<sup>48</sup> “Engineers Bring Light to Fallujah”, Harris, Scott, *American Forces Press Service*, Fallujah, Iraq, January 13, 2010, (accessed September 22, 2013), <http://www.defense.gov/news/newsarticle.aspx?id=57478>.

leader in this field with annual exhibitions in the courtyard of the United States Department of Defense's Headquarters, Pentagon. TZB® Board of Advisors include U.S. Ambassador Lincoln Bloomfield and Mr. Terry Tamminen.<sup>49</sup> Ambassador Bloomfield stated, "ZeroBase Energy LLC, is based in Ferndale, Michigan, with manufacturing done in Michigan with an American supply chain. ZeroBase has met with the UN Procurement Agency and is looking for opportunities to bid on UN projects. A strong new focus is hybrid microgrids, with projects recently finished in Hawaii, a village electrification project being finalized this summer in rural Kenya, and a new U.S. Agency for International Development-funded village project soon to begin in Haiti."<sup>50</sup>

Ambassador Bloomfield was the U.S. Department of State, Assistant Secretary of State for the Political and Military Bureau, the Ambassador at Large for the eradication of shoulder fired rockets and mines, and the Department of Defense Principal Deputy Assistant Secretary of Defense for International Security Affairs. Currently, he serves on the board of the Stimson Center, a Washington, D.C. think tank which regularly moves issues successfully through the beltway gridlock. His intergovernmental political and military experience in international cooperation demonstrates what is needed to realize increased use of SETM in UN PKO. Also of note at TZB, Mr. Tamminen was a special advisor to California Governor (R) Arnold Schwarzenegger for energy and environment as well as being a special advisor to current California Governor (D) Jerry Brown for the same fields. He also works with the UN as the head of the UN-supported R20 (Regions of Climate Action) initiative. These two gentlemen's U.S. business efforts show enormous potential for SETM implementation success in UN PKO. However, they must first climb the policy hill governing U.S. involvement in UN DPKO matters.

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<sup>49</sup> The Zero Base, <http://www.thezerobase.com/company/about-team-advisors>, (accessed December 27, 2013).

<sup>50</sup> Lincoln Bloomfield, Ambassador, Email interview with author, May 5, 2014.

Often, U.S. administrative and congressional policy makers find it difficult to determine the difference between U.S. foreign policy as it applies to defense, and U.S. foreign policy as it applies to UN PKO via U.S. Department of State. Opportunities definitely exist to increase the use of SETM in UN PKO if the UN DPKO officials were to reach out to these individuals for support on SETM initiatives.

Another U.S. company leading in the international SETM industry is SunPower®.<sup>51</sup> SunPower® recently worked with the U.S. Department of Commerce's Office of Private Investment Corporation (OPIC)<sup>52</sup> and the Chilean government to create two of the world's largest solar power installations.<sup>53</sup> SunPower's® majority investor is French oil giant Total®. Sun Power® markets a 24 percent efficient solar photovoltaic cell that is can be used within microgrids<sup>54</sup> like those described in the introduction of this thesis. This Total® investment in SunPower® is coupled with associated investments by U.S. Berkshire Hathaway®.<sup>55</sup> Because French and American investors are co-owners of this solar power giant, SunPower® is well positioned to be integrated into the UN DPKO procurement process. The U.S. and France are currently working together on UN PKO, notably within conflicts in Africa, among others. Also of note, Total® was recently acquitted for its alleged involvement in OFF corruption.<sup>56</sup> Ethical

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<sup>51</sup> Sun Power Corporation, <http://us.sunpower.com>, (accessed December 14, 2013).

<sup>52</sup> "Overseas Private Investment Corporation", U.S. Department of Commerce, (accessed December 8, 2014), <http://www.opic.gov/what-we-offer/investment-funds>.

<sup>53</sup> "Total, Sunpower And Etrion Partner To Build, Own And Operate 70 Mwp Solar Power Plant In Chile With Financing Secured From Us Overseas Private Investment Corporation, U.S. Securities and Exchange Commission", September 26, 2013, (accessed December 14, 2014), <http://www.sec.gov/Archives/edgar/data/879764/000119312513434506/d624592dex994.htm>.

<sup>54</sup> "On Alcatraz, Microgrids Break Free from Limitations" Asmus, Peter, July 2012, (accessed December 29, 2013), <http://featured.matternetwork.com/2012/7/alcatraz-microgrids-break-free-from.cfm>.

<sup>55</sup> "Buffett Utility Buys \$2.5 Billion SunPower Solar Projects", Davis, Tina and Goossens, Ehren, Bloomberg Sustainability, January 2, 2013, (accessed December 14, 2014), <http://www.bloomberg.com/news/2013-01-02/buffett-utility-buys-sunpower-projects-for-2-billion.html>.

<sup>56</sup> "Total and French Officials Cleared in Iraq Oil-for-Food Case", Associated Press, July 8, 2013, (accessed September 15, 2013), [http://www.nytimes.com/2013/07/09/business/global/total-and-french-officials-cleared-in-iraq-oil-for-food-case.html?\\_r=0](http://www.nytimes.com/2013/07/09/business/global/total-and-french-officials-cleared-in-iraq-oil-for-food-case.html?_r=0).

and sound public/private partnerships are of the utmost concern and that clearance for Total to do business with the UN was critical.

The recent development between Total and the UN was a critical one given UNPD requirements for vendors to survive the rigorous vetting process, which was a recent outcome of UN reform. Such vetting requirements are seen in an excerpt from a sample document from the UNPD involving current UN PKO contracting in Somalia which includes:

Prerequisites for Eligibility

In order to be eligible for UN registration [as a Vendor], you must declare that:

- A. Your company (as well as any parent, subsidiary or affiliate companies) is not listed in, or associated with a company or individual listed in:
  - I. the Compendium of United Nations Security Council Sanctions Lists ([http://www.un.org/sc/committees/list\\_compend.shtml](http://www.un.org/sc/committees/list_compend.shtml)), or
  - II. the IIC Oil for Food [OFF] List website or, if listed on either, this has been disclosed to the United Nations Procurement Division in writing.<sup>57</sup>

Although the U.S. shows the greatest potential politically and financially to move SETM in UN PKO forward during UN reform, two other top ten contributors, France and Germany, have recently developed-through a public private partnership-a solar cell almost twice as efficient as the SunPower's® 24 percent efficient cell on the market. The French company Soitech®<sup>58</sup> and the German research institute Fraunhofer-Gesellschaft created a prototype for a solar cell with 44 percent efficiency,<sup>59</sup> thereby almost doubling its efficiency rating of the SunPower® solar cell. Although France and Germany have Soitech®/Frunhofer technology and Germany is ranked first as the world's largest solar power producer, the U.S. can encourage the UN to include SETM in their peacekeeping missions. The potential for U.S., France, and Germany to collaborate on SETM in UN PKO success, within a UN policy framework, would serve UN reform. Much

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<sup>57</sup> "Request for Expression of Interest", UNPD, <http://www.un.org/depts/ptd/pdf/eoi9632.pdf>, (accessed July 5, 2014).

<sup>58</sup> Soitech ® <http://www.soitec.com/en/index.php>, (accessed December 8, 2013).

<sup>59</sup> Phys. Org, "World record solar cell with 44.7% efficiency", Last accessed September 23, 2013, (accessed December 8, 2013), <http://phys.org/news/2013-09-world-solar-cell-efficiency.html>.

doubt remains about whether the 44 percent efficient cell is ready for deployment, but the scale of the SunPower® cell, which is on the market, shows its relative availability as marketable.

#### UN policy for positioning SETM in UN PKO

As countries cooperate and collaborate to bring peace and stability within UN member states, they will need a reliable framework within which to see their investments in equipment are well expended. In the UN DPKO, that framework is the Contingency Owned Equipment (COE) policy.<sup>60</sup> UN COE is well administered but is not without needed improvements. The UN Office of Internal Oversight's Internal Audit Division's, Audit Report 2013/030, rated COE program implementation as 'Partially Satisfactory'.<sup>61</sup> No system of any dynamic nature with staying power is free from its evolutionary reforms and cyclical changes when growing within changing political and economic environments. The UN report was timely with regards to UN reform. Referencing the report's findings could be a way to incorporate new policy language taking SETM into consideration. According to the 65<sup>th</sup> Session of the UN General Assembly,<sup>62</sup> rates for reimbursement are flexible and always under development. This flexibility is important as up-front costs for SETM will initially be more expensive than outdated traditional and unsustainable energy resources. However, in the long run, the systems pay for themselves many times over. The graph portrayed in the UNEP's Greening the Blue Helmets shows a traditional

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<sup>60</sup> "Reform Of The Procedures For Determining Reimbursement To Member States For Contingent-Owned Equipment", United Nations General Assembly (UNGA) Resolution [On The Report Of The Fifth Committee (A/50/850/Add.3)] 50/222 May 10, 1996, (accessed December 22, 2013), [http://www.un.org/en/ga/search/view\\_doc.asp?symbol=A/RES/50/222](http://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/50/222).

<sup>61</sup> "Audit Report 2013/030", UN Office of Internal Oversight's Internal Audit Division, March 25, 2013, (accessed, December 28, 2013). <http://usun.state.gov/documents/organization/211267.pdf>.

<sup>62</sup> "Administrative and budgetary aspects of the financing of the United Nations peacekeeping operations", UNGA, Sixty-fifth session, Fifth Committee, Agenda item 143, (A/C.5/65/16), March 2, 2011, (accessed December 28, 2013), [http://www.un.org/en/ga/search/view\\_doc.asp?symbol=A/C.5/65/16](http://www.un.org/en/ga/search/view_doc.asp?symbol=A/C.5/65/16).

energy system supplemented by renewable energy.<sup>63</sup> Although that system is admirable, its energy efficiency and savings would be dwarfed in comparison SETM systems.

UN COE is a very detailed process that considers line items when evaluating the reimbursement rates and costs for items. Specifically, electrical items are categorized into major and minor item status. Major systems' 'wet/dry' lease reimbursements are arranged for equipment use and transportation of that equipment by troop/police contributing nations. Major electrical items (ie. potential SETM) that are above 20kVA (ie.16kW), and cost more than \$1000 fit into the 'Special Case' language of UN DPKO COE policy,<sup>64</sup> and can be reimbursed when its 'self-sustainment' use is applied to 'force' level as well as 'unit' level. In the case of SETM, the most efficient use would be at the 'force' level, and would surely be a 'major' item instead of a unit level 'minor' item. The power from the SETM at the 'force' level would be used by all units at the 'unit' level at a particular location; thereby cutting costs for redundancy of systems and "wet stacking"<sup>65</sup> of back up generation at the unit level, should there be a critical need.

This is not to say that 'minor' electrical/engineering items (ie. <16kW) should not also be used in daily operations as those items will significantly cut back on unit electrical expenses as well. U.S. Marine Colonel James Caley strongly emphasized the savings of using SETM in military operations at the annual Defense Energy Summit in Austin, Texas, USA.<sup>66</sup> The operations he described in his speech are the same sizes and require the same electricity demands

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<sup>63</sup> "Greening the Blue Helmets," United Nations Environment Program, May 31, 2012, (accessed November 24, 2013), pg. 29, [http://www.un.org/en/peacekeeping/publications/UNEP\\_greening\\_blue\\_helmets.pdf](http://www.un.org/en/peacekeeping/publications/UNEP_greening_blue_helmets.pdf) .

<sup>64</sup> "Scale of Assessments for the Apportionment of the Expenses of the United Nations Peacekeeping Operations", UNGA, Sixty-seventh session, Fifth Committee, Agenda item 145, (A/67/224/Add.1), Chptr. 3, Annex A, December 27, 2012, (accessed December 28, 2013), [http://www.un.org/en/ga/search/view\\_doc.asp?symbol=A/C.5/65/16](http://www.un.org/en/ga/search/view_doc.asp?symbol=A/C.5/65/16).

<sup>65</sup> Author's note: "Wet stacking is a method by which generators are connected and ran at less than optimal levels to avoid letting a generator reach life cycle before another. Synchronized wearing out of the generator is the goal to allow for procurement on the same schedule for replacements. This is a non-sustainable practice that wastes the life of the generator and the life of the fuel."

<sup>66</sup> Jim Caley, Colonel, Director, Expeditionary Energy Office, United States Marine Corps Headquarters, Defense Energy Summit, author's notes from speech to Defense Energy Summit, Austin, TX, November 11, 2013.

of UN PKO. These relatively minor electrical/engineering expenses for power are also reimbursable based on the operational Memorandum of Understanding (MOU) between the UN and the troop/police contributing country.<sup>67</sup> The reimbursements also account for items transferred or procured from bilateral troop/policy contributing country operations. In these cases, it is appropriate an amendment be written to the original MOU, as is also the case with reimbursements for moving units in mid-operation. If such mid-operation movements are required, SETM is well suited with temporary rented industrial moving equipment and trucks.

Overall, the COE operational policy requirements for procuring the amount of essential electrical generation needed per manned unit is conducive to accepting, and does not prevent the integration of, SETM as long as the SETM with ‘operational capability’ and ‘sufficient backup capacity’ to main camps and medical facilities ‘around the clock’ is provided. As is often the case with the use of SETM in field environments, the SETM battery storage, by default, serves as the back up to the system. If the batteries no longer hold a charge, smaller, and more fuel efficient than traditional, generators are used to recharge those SETM batteries.<sup>68</sup> For example, at night if the batteries are depleted late into the evening after the sun charged them during the day, then a more efficient generator can charge the batteries. In the case of COE providing the framework for SETM implementation, the remaining considerations are for budgeting and financing their procurement.

#### UN DPKO budgeting

The UN Member States are responsible for providing assessed contributions towards a Working Capital Fund that is administered by the UNSG upon review and advice from the UN Advisory Committee on Administrative & Budgetary Questions, which provides its

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<sup>67</sup> Ibid, Annex B.

<sup>68</sup> “Applying Energy Surety to Military Bases” Sandia National Laboratory, July 2011, (accessed November 16, 2013), [http://energy.sandia.gov/?page\\_id=795](http://energy.sandia.gov/?page_id=795).

recommendations to the UNGA for contribution levels. The UNGA reviews the recommendations and provides a recommendation to the UNSG/SC. The fund is then referred to in order to set additional UN DPKO contribution levels. Those contributions are then apportioned to each approved UN PKO according to the mission budget requests. If a new UN PKO is requested by the UNSG and approved by the UNSC, startup costs cannot exceed \$100M, and money is allocated; UN DPKO may also use up to \$150M in the Peacekeeping Reserve Fund for a rapid response operation. If costs are expected to exceed \$100M, a UNGA vote is required.<sup>69</sup> Leadership support is required for funding appropriations and the political conventions described otherwise in this thesis provide some clarity on that process.

#### Possible financing options for UN procurement of SETM

Considering the above UNCOE policy of reimbursement and UN finance and budgeting support framework, a troop/policy contributing country might ask what financial and budgetary policy support exists for their country to be able to afford the up-front costs for ensuring SETM be included in their designated UN PKO under UN DPKO finance and budgeting. An optimist may realize, although financing and budgeting based on program cost effectiveness has always been an important factor in the successful conduct and continuation of UN PKO, UN financing and budgeting as a whole is not based on creating a resulting direct profit or declining costs. Additionally, focusing on a cost benefit analysis of SETM in UN PKO (although SETM are more cost effective than the use of fossil fuel energy generators in the long run) need not be a primary focus at the infant stages of this recommended policy implementation, as the financial savings/returns are realized at later years of the SETM life cycle. It is common knowledge major components of the SETM life cycle last up to 30 years with little to no repairs or overhead costs

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<sup>69</sup> Peace-Keeping Budgets: Current Process Of Establishing And Extending Peacekeeping Operations UNDPKO, (accessed January 11, 2014), <http://www.un.org/en/ga/fifth/Presentations/67th%20session/peacekeepingfinance.pdf>.

in comparison to fossil fuel systems. Considering the non-profit nature of UN PKO and the eventual unintended markets started from the use of SETM in UN PKO, (as is the case with traditional energy generation facilities and mechanisms like portable and semi-permanent diesel generators) the procurement of SETM should be well received by UN DPKO voluntarily contributing nations.

This was the case with the Joint Iraq Needs Assessment conducted by the UN/UNDPKO/World Bank. The host country needs and assessments are first taken into consideration before determining what UN support is needed to conduct peace building development projects and programs with World Bank financing.<sup>70</sup> If the host nation is able to procure electricity, the question becomes: How can SETM be better integrated into its more than likely antiquated/obsolete power grid? In its assessments, the UN, working with the UN DPKO and other UN sub-organizations, could offer suggestions how energy be produced and used in sustainable and environmentally sound ways as a procedure within financing consultations. Considering long term sustainability, SETM should not be suggested as an alternative but as a targeted standard. In the case of post conflict/disaster fossil fuel rich LDCs, UN DPKO might offer incentives to them to move beyond their fossil fuel energy resources to implement SETM. Those countries could use fossil fuel export revenues, however waning as the world transitions off them, to pay for SETM, and become emerging markets for competing developed nations SETM exports.

Because of the potential seeding of markets from the education and use of SETM in UN PKO, developed countries providing funds to the UN would have the opportunity to compete hand over fist to equip LDC troop/police contributing countries with the necessary SETM and/or

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<sup>70</sup> “Joint Iraq Needs Assessment”, United Nations and World Bank, New York and Washington, D.C., October 2003 (accessed December 28, 2013).

SETM financing and pre-deployment training. The U.S. and BRIC nations will surely see the benefits of their assessed contributions when reimbursing SETM for LDC troop/police contributing nations to take to PKO, via the COE reimbursement system. Incentives work well in a free capitalist market. Perhaps within the current reform environment, incentives could be used for financial contributing countries that provide SETM to UN PKO. One such an incentive could be to create a SETM technology energy credit that could count towards the monetary equivalent in funds that normally would be accounted for as member financial contributions. Such a mechanism is used in many markets to encourage the use of SETM throughout the developing world. Although not directly representative of SETM, a good example for modeling of this type of sustainable development encouragement is seen with the U.S. Energy Star Program's tax deductions<sup>71</sup> for renewable energy use, and rebates. Furthermore, those financially contributing countries' national governments might also provide nation level tax incentives for those countries to build future and emerging markets from contributing SETM to LDC troop/police contributing operations like the U.S. Department of Commerce's OPIC. OPIC's role is to "mobilize private capital to help solve critical world challenges...."<sup>72</sup> Finally, those operations requesting SETM from developed nations could be able to create future trade credits with developed nations for favorable future trade conditions and more favorable trade partnership status.

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<sup>71</sup> U.S. Department of Energy, Energy Star Program, 2014, (accessed January 25, 2014) [http://www.energystar.gov/index.cfm?c=tax\\_credits.tx\\_index](http://www.energystar.gov/index.cfm?c=tax_credits.tx_index).

<sup>72</sup> "Overseas Private Investment Corporation", U.S. Department of Commerce, (accessed January 25, 2014) <http://www.opic.gov/what-we-offer/investment-funds>.

## UN DPKO contributors' political influence and decision making

Moving money is the easy part of creating these opportunities to use SETM. Creating the political will from decision makers can be a challenge. Encouraging a forward leaning approach to SETM in UN PKO is as imperative as the physical transition from fuels of yesterday to the fuels of tomorrow. The UN is in the unique position to consider prepositioned and warehoused SETM plans within the private industry procurement and logistics bidding process for response to those conflicts before ensuing post conflict/disaster UN PKO reconstruction takes place. Such a prepositioned plan would naturally need to be tailored to each country as they volunteer for participation and tailored for each conflict. It is important each country accept the up-front costs of arriving at the UN PKO with SETM. Requiring those upfront cost will ensure those troops/personnel are integrally invested in the safe arrival, set-up, and operation of their own systems. Once the systems are up and running and local operators are training to operate the SETM, assessments will provide proof of their operation, and TCCs can then apply for COE reimbursements. An example of how procurement and installation might take place can be seen in the U.S. DoD's Rapid Innovation Fund (RIF) procurement concept recently reported by the *Wall Street Journal*.<sup>73</sup> RIF provides a collaborative vehicle for small businesses to provide the department with innovative technologies that can be rapidly inserted into acquisition programs that meet specific defense needs<sup>74</sup>. Forward thinking is what led to the creation of RIF.

Realizing a proactive approach to prepositioning SETM for operations is a political discussion. That discussion is rooted in each contributing nation's interests in recovering their contributions indirectly through the positive economic, political, and social outcomes of UN

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<sup>73</sup> "EaglePicher Receives Contract from Erigo Technologies to deliver a Flexible Microgrid Energy Storage System for DoD applications", Market Watch, February 19, 2014, (accessed July 19, 2014), [http://www.marketwatch.com/story/eaglepicher-receives-contract-from-erigo-technologies-to-deliver-a-flexible-microgrid-energy-storage-system-for-dod-applications-2014-02-19?reflink=MW\\_news\\_stmp](http://www.marketwatch.com/story/eaglepicher-receives-contract-from-erigo-technologies-to-deliver-a-flexible-microgrid-energy-storage-system-for-dod-applications-2014-02-19?reflink=MW_news_stmp).

<sup>74</sup> Ibid.

PKO missions. The realization of MDGs is the determining measure to those successful outcomes. As stakeholders, contributing nations have two variables with which to work to realize the outcomes they desire. Those variables are monetary contributions and troop/police contributions. The U.S. has a firm leading position considering financial contributions in comparison with all other nations. Pakistan and Bangladesh have firm leading positions considering troop/police contributions in comparison with all other nations. Past UN programs using advanced technology, largely absent before UN PKO arrived at the conflict/disaster, have proven to significantly improve the lives of the host location.<sup>75</sup> Every indication exists the increase use of SETM in UN PKO will also yield the desired results. Pakistan is already invested in national energy programs involving SETM<sup>76</sup>, as is the U.S. Both countries have mutual political interests in LDCs peaceful development, with the U.S. benefits already provided earlier in this paper, and Pakistan's desire to distance itself from Iran's oil and atomic problems in their region via increased SETM use. Politically, both contributing countries would benefit and could build stronger markets for U.S. SETM in the region, and the world.

## CONCLUSION

Less developed member nations of the UN system seek UN PKO intervention to help maintain their human rights and uphold international laws of armed conflict. Those who seek UN support to rebuild after climate change caused natural disasters and man-made conflicts are in positions of extreme need, often with their short and long term lives in peril. Some LDC nations are aware of the state of SETM technology and seek only to rebuild their electrical infrastructures with today's modern ideas. Some LDC nations have never had electrical

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<sup>75</sup> Todd Howland, Special Representative for the United Nations High Commissioner for Human Rights, MONUC, "End the Violence - Build a Bright Future, UN Acting As One: Communications for Congo", November 16, 2010.

<sup>76</sup> "Pakistan outlines plans for country's first solar park", Global Climate Change News and Analysis, July 26, 2013 (accessed July 26, 2014), <http://www.rtcc.org/2013/07/25/pakistan-outlines-plans-for-countrys-first-solar-park>.

infrastructure and have a limited knowledge of how to research such technology. In both cases, whether the limitations are financial and/or technology based, taking advantage of those in need by providing them analogue and outdated generations of electrical power supplying technology at low cost is not in keeping with the intent of MDG #7. It is also not in the political or diplomatic best interests of UN member nations who might create new markets for SETM by providing them to LDCs. LDCs would appreciate the SETM and the jobs they create. According to the Center for American Progress, “Clean-energy investments create 16.7 jobs for every \$1 million in spending. Spending on fossil fuels, by contrast, generates 5.3 jobs per \$1 million in spending.”<sup>77</sup> The same could reasonably be true in LDCs. All member nations benefit, even as nations whose economies are based on their natural fossil fuel resources are themselves converting to SETM.<sup>78</sup> Now, is the time for UN DPKO to lead UN reform efforts to firmly establish concrete improvements. Peacekeepers lead the way and would lead better with SETM.

The UN DPKO works within its COE policy to provide feasible materiel and logistics policy for the delivery of goods and services to UN PKO. The COE processes can be improved according to UN auditing offices. That needed improvement is symbolic and part of the overall need for UN reform. The U.S. leads in UN reform activities and shares the lead in SETM research, development and marketing; so creating synergies between the two concepts should be an attainable goal realized in the delivery of increased amounts of SETM to operations. How UN PKOs are financed and budgeted is already well established. New policy revisions need only be made to include SETM categorized contributions, with adjusted funding amounts to

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<sup>77</sup> “Clean Energy Investment Creates Jobs in Every State: Fact Sheets for the 50 States and DC”, Heidi, Pollin and Robert, Heintz and Garrett-Peltier, James, June 17, 2009, (accessed December 28, 2013), <http://www.americanprogress.org/issues/green/news/2009/06/17/6272/clean-energy-investment-creates-jobs-in-every-state/>.

<sup>78</sup> “Saudi Arabia Plans \$109 Billion Boost for Solar Power”, Mahdi, Wael and Roca, Marc., May 11, 2012, (accessed December 28, 2014), <http://www.bloomberg.com/news/2012-05-10/saudi-arabia-plans-109-billion-boost-for-solar-power.html>.

reflect the difference in the economies of scale between fossil fuel electricity materiel and SETM materiel. The World Bank is firmly established to handle such financing and has adopted similar processes for bringing power to post conflict/disaster reconstruction for decades. The UN program infrastructure within the UN DPKO, UNEP, UNDP, UNIDO, and various member nation contributing programs is established and poised to build out operations based on models already established by those entities. UN procurement offices have models from preliminary efforts already made.

Finally, the benefits of both SETM and UN PKO are evident when considering the vast majority of developing nations that ascribe to the UN MDGs are also individually benefitting from both. The discussion of the use of SETM in LDC UN PKO is largely a political one. With all political discussions, the political gains and losses in democracies are found in their citizens' votes and willingness to accept, implement, and practice the policies promulgated by their elected officials' actions. Former President Bill Clinton, a champion of UN PKO, wrote in his book, *Giving: How Each of Us Can Change the World*, "No book about public service by private citizens would be complete without recognizing the essential role of government-its laws, regulations, programs, and grants-in advancing the common good and the importance of citizen activism in securing good government."<sup>79</sup> If UN reform is to successfully be implemented, it is essential that reform takes place as a result of supporting the member countries citizens' will to participate. That will to participate and assist in the development of those societies into nations achieving the UN MDGs is strengthened by the use of SETM in UN PKO.

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<sup>79</sup> Bill Clinton, *Giving: How Each of Us Can Change the World*, (New York: Knopf, 2007), 185.

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- Author's note: Iran's, North Korea's and Cuba's antiquated and obsolete power infrastructures; whose leaders not only burn fossil fuels, but who are attempting to become autonomous atomic states, in violation of UN anti-nuclear proliferation treaties, to provide power to replace oil imports with alleged ulterior motives to produce atomic weapons.
- Author's note: Wet stacking is a method by which generators are connected and ran at less than optimal levels to avoid letting a generator reach scheduled life cycle before another. Synchronized wearing out of the generator is the goal to allow for procurement on the same schedule for replacements. This is a non-sustainable practice that wastes the life of the generator and the life of the fuel.
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