Global Green Growth Forum
8-9 October 2012, Copenhagen

STRATEGY SESSION ON ENERGY EFFICIENCY INDICATORS
A PUBLIC-PRIVATE PARTNERSHIP (PPP) TO ADVANCE THE GLOBAL ACCEPTANCE OF THE ENERGY EFFICIENCY POTENTIAL OF MOTOR-DRIVEN SYSTEMS
BACKGROUND CONCEPT NOTE

INTRODUCTION/EXECUTIVE SUMMARY

Scaling up global adoption of Best Practice Technologies (BPTs) and Standards across industry sectors and processes

The Global Green Growth Institute (GGGI) and the United Nations Industrial Development Organisation (UNIDO) propose to work with the International Partnership for Energy Efficiency Cooperation (IPEEC), the International Energy Agency (IEA), the IEA Implementing Agreement for Efficient Electrical End-use Equipment (4E) Electric Motor System Annex (EMSA) and private sector partners on building a Public-Private Partnerships (PPP) to develop and promote best-available/best-practice energy efficiency indicators across industry sectors and processes.

From its outset the PPP is organized as an "open architecture" collaborative forum for private and public partners and civil society organizations to develop a growing portfolio of industry energy efficiency indicators, to accelerate and scale-up the global up-take and deployment of best available technologies, best-available practices and best-performance indicators in the industrial sector. The overall objective of the PPP is to develop indicators and promote the uptake of indicator-based systems for monitoring and benchmarking performance and progress over time – both at industry and country/regional level. This will contribute to catalysing action and accelerating the uptake of best practices and technologies. The PPP will strive to align work with on-going initiatives in this area. If feasible, benchmarks and indicators may be taken up by industries and countries and promulgated to national or international standards.

The PPP initiative is launched in support of the opportunities and goals created by the UN's Sustainable Energy for All (SE4All) of doubling the rate of improvement in energy efficiency and will provide partners with new opportunities to leverage and enhance their work, while supporting capacity building and knowledge sharing among industries and countries.

This paper briefly considers the elements of the PPP in the area of industrial energy efficiency and with a particular focus on advancing industrial motor systems efficiency and the best-available policies, practices and technologies that contribute to accelerating the design and uptake of efficient motor systems.

The initiative will build on the UNIDO experiences from developing motor-systems indicators in China, UNIDO's on-going program in support of implementing ISO 500001 in 11 developing countries, and IEA's and IPEEC/IPEEI's work on developing guidance/manuals on data-collection and establishment of indicators. The Partnership will support an integrated approach to industrial energy efficiency and the implementation of the new ISO 50001 energy management standard.

The initiative will also build on the extensive work and experiences developed within 4E EMSA and on IEA work in the area of promoting the development of policies for increasing the energy efficiency of motor systems and their uptake in industry.

1. CONTEXT – OPPORTUNITIES AND CHALLENGES

Even in the most proactive of industrialized nations examined by the International Energy Agency (IEA), less than 60% of all identified and recommended options to improve EE are being employed. Motor-driven equipment accounts for approximately 60% of manufacturing final electricity use worldwide. Motor systems represent a largely untapped, cost-effective source for industrial energy efficiency savings that could be realized with existing technologies. Analysis indicates potential EE savings to 10-15% (compared to 2-3% on individual motors), corresponding to some 120 billion USD in annual savings by 2030.

Barriers
Although motor systems have the potential to contribute substantial energy savings, in final energy use, this potential remains largely unrealized (UNIDO, 2010). Major barriers to effective policymaking, and uptake of efficient systems, is the lack of a transparent methodology and supporting data for;

- quantifying the magnitude and cost-effectiveness of energy savings and
- tracking improvements in motor system energy efficiency at the enterprise, sector, national and regional level,.

Enhanced quantification and tracking of data related to the efficiency of motor systems will also contribute to tackling further barriers such as lack of prioritisation of energy efficiency in corporate decision making.

Shortcomings of existing measures and initiatives to overcome barriers
A number of international organizations, investors and project developers in the field of energy efficiency have pointed to the lack of data, awareness and reporting standards hindering resource and energy efficiency investments and implementation. Collecting better and more granular data, and building EE indicators in an increasing number of industrial processes and sectors, and at the same time promote these indicators across industry, countries and technology vendors will ultimately create a stronger business case nd implementation capacity for energy efficiency investments. Indicators provide roadmaps for industries and regulators to increase their energy efficiency by setting more ambitious targets. The IEA indicates in their report on "Tracking Industrial Energy Efficiency and CO2 Emissions" (IEA/2007) that improved efficiency potentials for motor systems is 20%.

See also the more recent publications:
http://www.iea.org/papers/2011/EE_for_ElectricSystems.pdf

http://www.iea.org/papers/2011/Walking_the_Torque.pdf

The United Nations Development Organization (UNIDO) has undertaken a global initiative on industrial energy efficiency, focused on energy management and systems optimization, which is designed to address these barriers. With the support of the host countries and the Global Environmental Facility, a series of projects at the national and facility level are engaging a range of stakeholders in the industrial energy efficiency market toward that end: government, regulators, factory personnel, industry managers, service providers and equipment vendors. While these efforts are extremely important, more needs to be done to provide a framework for effective national and international decision-making on industrial energy efficiency policy as it relates to motor systems.

Opportunity - Developing energy efficiency indicators for motor systems
Considerable work has been conducted in relation to motors' and motor-systems' energy efficiency potentials that creates an opportunity for this initial PPP effort.

In the publication *Motor System Efficiency Supply Curves: Assessing the Energy Efficiency Potential of Industrial Motor Systems* (UNIDO, 2010), UNIDO partnered with Lawrence Berkeley National Laboratory (LBNL) to develop an initial effort to address these barriers through an analysis of available data from five countries and the EU, in combination with expert opinion. As part of these analyses, a short list of indicators were developed for three types of motor systems (compressed air, pumping, and fans) that were used to establish a low-medium-high base case efficiency scenario for each system type.

The availability of better data (consistent quality and greater quantity) on current motor system practices and technologies, by country, combined with additional work to obtain expert opinion at a more granular level, could facilitate the refinement of these analyses into energy efficiency indicators for motor systems. This could be accomplished by developing a data collection framework in consultation with motor system experts, testing the data collection framework through application in UNIDO's on-going system optimization projects, and establishing a network of motor system experts and researchers, possibly aligned with universities, to initiate data collection more broadly.

The opportunities that are provided by the UNIDO programs in support for the development of this PPP can be summarized as:

i. The methodology for the development of set of motor system indicators could be introduced/ taught/tested in the EXPERT training curricula and piloted in some partner companies.

ii. Within the UNIDO EnMS/ISO50001 there is the concept of energy performance indicators, in particular for significant energy uses, such as motor systems;

iii. The indicators could be presented and briefly explained in the USER training. The possibility of explaining also its development would depend on the complexity of the indicator.

iv. The ongoing (and future) work of UNIDO within the energy management system (EnMS) and system optimization (SO) EXPERT trainings (see Annex).

v. Capacity building for the indicators system would take place within the EXPERT program and to the extent feasible within the USER. It is more than likely that the content of the existing UNIDO training material will support the development of least some of the motor system efficiency indicators. It should be noted however that the degree of effort needed for scaling up dissemination/ calculation of the indicators to a large number of companies would depend on the complexity of the indicators.

vi. Data collection is an integral part of EnMS/ISO 50001 implementation in UNIDO partner enterprises. Within the scope of the SO EXPERT training, energy assessments are carried out in partner enterprises. Motor system indicators could be calculated by the national EXPERT trainees with the support of international experts. Some enterprises are likely to have the data that are needed for the motor-system indicator.

vii. Capacity building for the indicator would take place within the EXPERT program and to the extent feasible within the USER.

It should be further noted that motor-driven systems are different from one another and depend largely on the energy needs of the process. This could be the main reason why there are no MEPS for systems and why there are only standards on how to assess their performance (US ASME and partially ISO). In this context, the UNIDO and GGGI welcome the inputs and expertise from other PPP partners, who hold strong expertise in data-collection and in building/establishing indicators, on the detailed scoping of this PPP initiative.

Engaging the Private Sector in the acceleration and dissemination of EnMS/ISO50001-Motor-Driven-System (MDS) best practices indicators and standards

Industry support is critical to the success of developing and securing implementation of effective EE indicators, in particular in relation to process/systems indicators where industry, technology and facility information and data need to be collected, documented and analysed consistently.

Successful energy efficiency policies and programmes depend heavily on top management commitment to energy efficiency. In this regard, establishing appropriate and ambitious energy efficiency targets can provide a strong incentive for the adoption of energy efficient technologies, practices and measures. The indicator system will enable better and more informed target setting.

Once targets have been established and/or corporate management has made a commitment to improve energy efficiency, it is essential to institutionalise energy management in a wider culture for sustained improvement. Energy management standards, such as EnMS/ISO 50001 provide firms with the guidance and tools they need to integrate energy efficiency into their management practices, including into the fine-tuning of production processes and steps to improve energy efficiency of industrial systems, including motor-driven equipment and systems. Developing and promoting the adoption of indicator systems will contribute to ISO50001 implementation.

UNIDO is promoting the adoption and dissemination of EnMS based on the ISO 50001 standard. This program of work will in return support the development of motor-systems EE indicators by involvement of private sector partners in:

a. Training curricula and programme
b. Implementation of MDS → case studies and data
c. Championing use of EnMS by some large companies
d. Championing use/offer of MDS best practices/services by some large companies
e. Supply chain dissemination championing/promotion
f. MDS technologies and services catalogue/database with countries offices/vendors/contacts – CD with schematic of each system

The above mentioned activities will be in support of developing EE motor-systems indicators and anchor these via private sector engagement in EnMS/ISO500001 program activities undertaken by UNIDO.

2. THE PPP – VISION, ORGANIZATION AND STRATEGY

Vision

The PPP's broad-aim is to expand the implementation of industrial energy efficiency policies, standards and measures that promote energy efficiency market penetration. In the coming years it is the intention to organise similar processes (as for motor-systems) on other energy efficiency targets of opportunity.

As an immediate objective the PPP will provide a common technical foundation that will facilitate the adoption of cost-effective policies and will support the development of stronger and broader EE indicators for motor-driven-system by expanding the data-collection and geographical scope of the analytical work of UNIDO and partners, and by anchoring this via private sector engagement in a.o. the on-going EnMS/ISO500001 work program of UNIDO in 11 countries. The initiative will build on and coordinate with on-going programs and activities undertaken by the IEA/IPEEC on developing guidelines/manuals on EE data-collection and EE indicators' development in relation to motor-systems.

This PPP initiative provides the partners with an opportunity to advance the research efforts to meet the need for quantifying motor system energy efficiency potential with a view to supporting an international dialogue with industry, policy makers and other stakeholders who are interested in the energy efficiency potential of motor systems. Through this dialogue, it is hoped that the initial framework for quantifying motor system energy efficiency potential developed by UNIDO in its research on motor systems efficiency supply curves will be further refined based on additional input and data and the expanded country coverage:

g. Phase II Cost Curves
    i. Improved (more data) and validated methodology
    ii. More country coverage (e.g. Chile, China, Argentina, Russia, Mexico, South Africa)
    iii. Manual/Guidance for national implementation
h. Market diffusion indicators (as part of data collection for cost curves)
    i. Methodology
    ii. Pilot for some key technologies (i.e. EE motors, VSD, 1-2 others; services also possible)

Organisation and strategy

The GGGI and UNIDO are leading the PPP initiative with the IPEEC/IPEEI and the IEA as key partners to secure a broad and strong institutional base for anchoring the initiative, to coordinate with on-going programs, and to secure technical capacity associated with the initiative. The key partners – with interested and relevant private sector partners – will form the PPP's **Steering Committee**. The Steering Committee will once a year assess and identify energy efficiency targets of opportunity to develop and promote new EE indicators and best-practice policies.

In UNIDO's experience, substantial interest was expressed in further advancing the analytical work of promoting EE motor system indicators by motor system experts who participated in relevant UNIDO projects and industry conferences. As part of its contribution to this PPP, UNIDO will also contribute valuable in-depth case study information resulting from its industrial system optimization training programs in developing countries (see Annex). The development of the indicators will require data collection, which will be supported by the on-going UNIDO projects as well as by the core partners of this PPP initiative.

The PPP initiative on motor-systems will establish an **International Network of Experts** on Industrial Motor Systems Efficiency to support the implementation of the PPP objectives and strategic actions with a view to increasing the market penetration of energy-efficient industrial motor-driven systems by helping industry to adopt best practices and standards for energy management.

The Network will bring together experts, researches and practitioners from key institutions and agencies that are working in the area of industrial energy efficiency in order to catalyse the acceleration of industrial energy efficiency implementation through knowledge sharing and cooperation.

Moreover, what will distinguish this Network from similar efforts will be its grounding in real data and its ongoing efforts to use those data to assist policy makers in determining what is effective. In fact, the Network will represent the first concerted effort to collect more data on motor system energy efficiency and then to apply that information to develop

1) A clearer understanding of current motor system energy efficiency performance;
2) A better estimate of global energy efficiency potential;
3) Motor system program design models and guidance on their application and estimated energy savings.

This could be done fairly reasonably as a collaborative project across countries involving the mentioned institutions, technical universities and private sector partners.

The Network will support the development of practical tools, methodologies and solutions that will assist industrial users in the assessment and implementation of system improvement opportunities and market penetration of efficient motors and equipment. Other complementary activities, such as the development of regulatory frameworks and capacity building, will also be supported by the Network.

The proposed structure and implementation arrangement for the Network are as follows:

- A **Working Group** will be established comprised of the leading experts and stakeholders of the Network. The Working Group would be responsible for approving the work program for work undertaken under the Network, as well as for selecting a **Program Coordinator** to manage the "day-to-day" work undertaken under the Network and to provide technical review for documents produced through the Network. They are also expected to contribute their staff time and resources to the Network and to contribute to raising the necessary funding.

- A **Program Coordinator** would be competitively selected to coordinate and undertake some of the tasks of the work program and would report to the Working Group. The Terms of reference (ToR) will be developed for the Program Coordinator by the Working Group.

- **The Working Group** will meet at the beginning of the proposed 3-year project and will hold yearly meetings thereafter. The first meeting will focus on the development and agreement of the work program. Most of the interactions of the Working Group, and with the Program Coordinator is expected to be done electronically, but face-to-face meetings at key strategic times should be envisioned.

Resources

There is so far no final decision on the financial aspects of the PPP initiative. Additional activities of the PPP related to data-collection, analysis and establishment of motor-systems indicators will need financing from external sources (bilateral or international donors, private sector partners and sponsors). An overall work-program and budget for the PPP initiative is being developed.

The GGGI will allocate 1 full time PPP manager (a Program Coordinator) who will refine the PPP work-program, convene meetings and work-shops for the PPP initiative, conduct reporting and facilitate marketing and awareness raising initiatives. The GGGI may also be looking to support analytical work and work-shops of the International Experts Group of the PPP initiative.

UNIDO will allocate 1 project manager (UNIDO PPP Coordinator), who will liaise with the PPP partners, provide technical contribution and will run day-to-day activities pertaining to supporting and convening the PPP activities. In addition to that, UNIDO will contribute to the operational costs and will seek to mobilize funding in support of the implementation of technical activities (e.g. research and data analysis and collection; preparation of technical papers and notes, convening of the International Network of Experts etc). It should be noted in this regard that the extent of the UNIDO technical and operational engagement will largely depend on the availability of programmable resources and funding to support concrete research, projects and data collection efforts.

Further analysis needed to narrow down or specify the green growth potential

The work-program of the PPP will include suggestions for new analysis related to the impact and penetration of motor-systems indicators and its green growth potentials.

Evolution and progress to date of the initiative

This PPP Background/Concept Note constitutes the development of the initiative to date.

Annex

Motor-driven system indicator – Opportunities in UNIDO Programmes

1. The UNIDO Motor-driven System Capacity Building Programme

UNIDO has training programmes on the following motor-driven systems:

1. Pump System Optimization
2. Fan System Optimization
3. Compressed-air System Optimization
4. Motor System Optimization

Each programme consists of three elements (Fig. 1 is referred to Pump System):

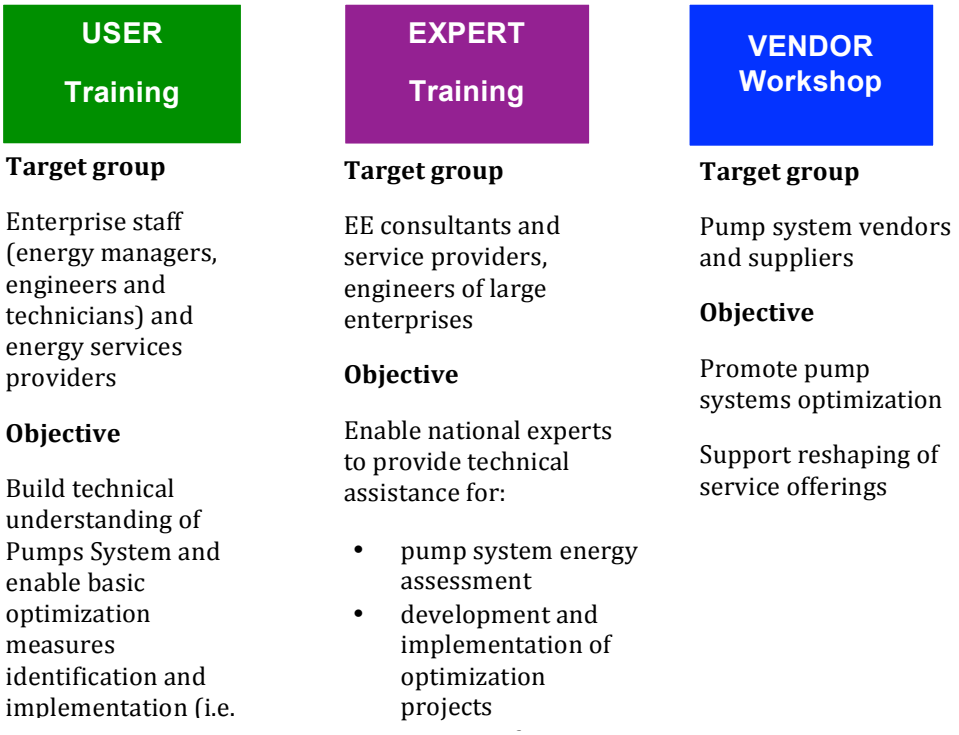

Fig. 1 Elements of UNIDO Pump System Optimization capacity building programme

The USER training is 2 days

The EXPERT training is 7-8 days over 5-6 months
This is an intensive training delivered by leading international experts. National trainees are trained through classroom, on-the-job and coaching by international experts. The VENDOR workshop is ½ day

2. The UNIDO EnMS/ISO50001 Capacity Building Programme

The UNIDO EnMS Capacity Building Programme comprises of three elements:

- Awareness seminar
- USER training
- EXPERT training

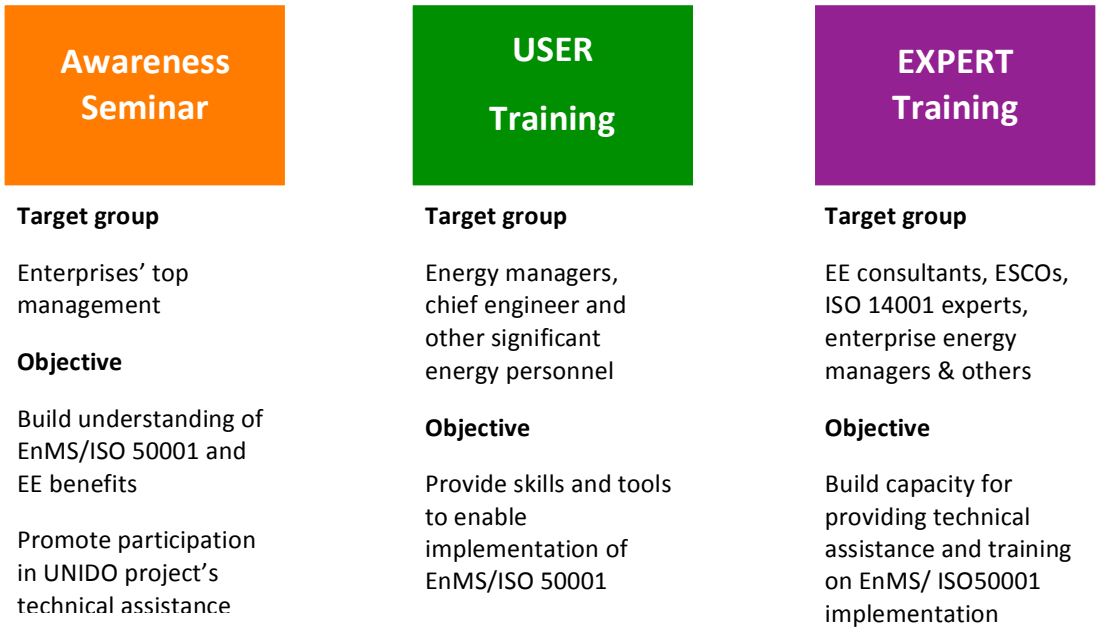

Fig. 2 Elements of UNIDO EnMS/ISO 50001 capacity building programme

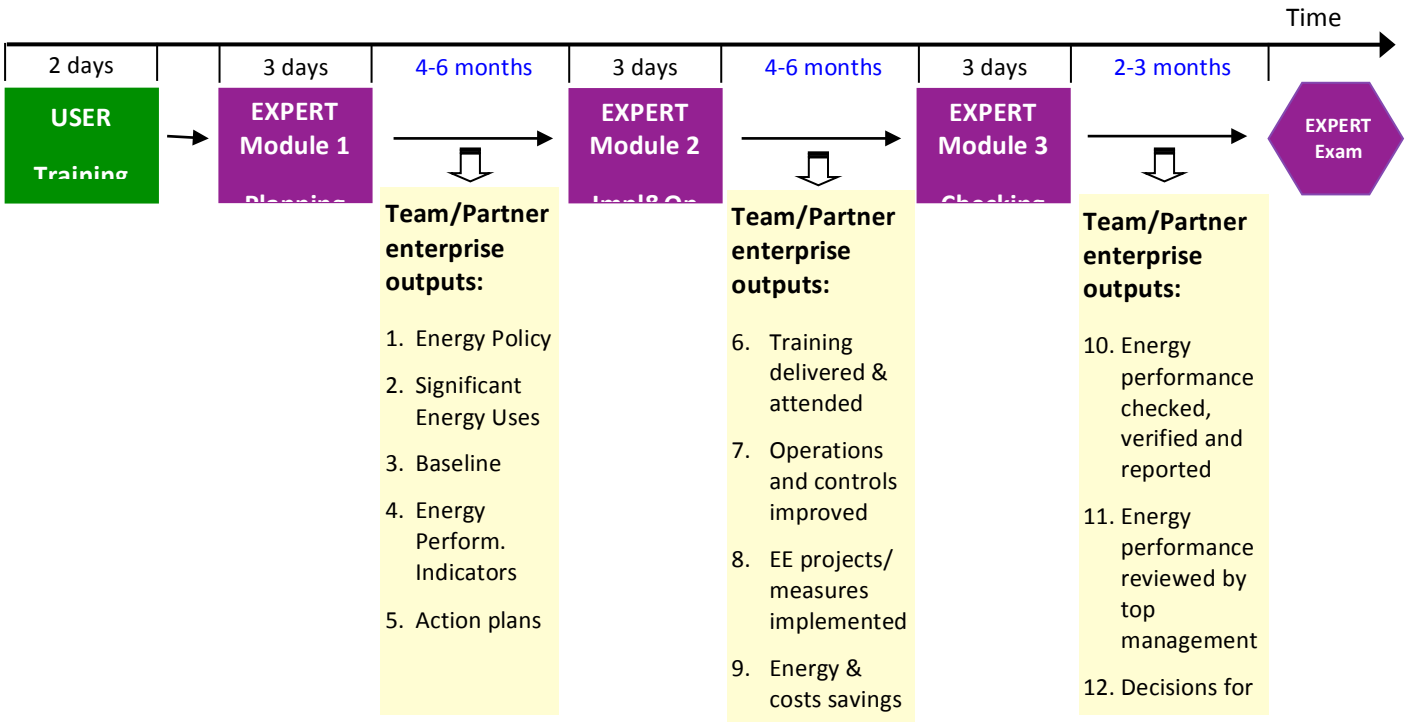

Fig. 3 Structure of UNIDO EnMS/ISO 50001 EXPERT Training