Co-benefits of MRV itself!

Additional value of the MRV system for the Tunisian NAMA on energy efficiency and renewable energies in buildings

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Summary

The Tunisian Building NAMA aims to reduce GHG emissions from energy consumption in the housing sector by 4.8 million tons CO_2eq below baseline by 2030. The main instruments are financial incentive programs promoting improved thermal insulation as well as solar water heater and photovoltaic installations in residential and tertiary buildings. Although the implementation of the NAMA brings various social and economic co-benefits, the realization of the incentive programs remains linked to a large administrative workload by the entities in charge. In order to address this challenge and ensure the effective implementation and management of the NAMA, ANME in cooperation with GIZ have developed an operational MRV system for the NAMA which helps reducing the administrative workload by 67% and thereby exceeds traditional expectations on MRV systems for NAMAs.

Introduction

NAMAs (Nationally Appropriate Mitigation Actions) have become a major instrument for greenhouse gas (GHG) mitigation in developing countries. The most recent 2016 mid-year update of the Status Report on NAMAs [Ecofys & ECN 2016] reports that 178 NAMAs are being developed worldwide, of which 16 are at the implementation stage. Even when originally developed as a voluntary instrument for developing countries to contribute to pre-2020 mitigation efforts, their character as mid-and long-term sectorial strategies aiming at fostering transformational change and sustainable development, also makes NAMAs an important element for realizing countries' (Intended) Nationally Determined Contributions ((I)NDCs). More than one-third of the developing country Parties, which submitted INDCs, proposed to use NAMAs to achieve their outlined INDC targets [Ecofys & ECN 2016, UNFCCC].

The objective of fostering sustainable development in a sector or sub-sector logically leads to the fact, that NAMAs are (mostly) not only limited to GHG emission reductions, but also (or even more) to other positive development impacts, the so-called **co-benefits** (development benefits). These co-benefits range from cost savings and job creation in case of renewable energy measures, to food security and preservation of biodiversity in the case agriculture and forestry NAMAs, to the improvement of health conditions in case of NAMAs on waste management. Nearly all existing or planned NAMAs tend to create as many as possible of these co-benefits. Whether the GHG mitigation effects of a NAMA outweigh the co-benefits in terms of importance or vice versa depends on the political drivers for the NAMA development and varies from case to case.

Measurement, Reporting and Verification (**MRV**) systems are a crucial element in the development and implementation of NAMAs. Projections of GHG emissions and potential reductions allow project operators and policy makers to carefully design a NAMA or choose among several options of measures/actions. Monitoring and ex-post analysis during the NAMA implementation phase help stakeholders to better understand if policies or measures are effective and allow them to intervene, if necessary, by increasing efforts or adapting instruments. Given the importance of co-benefits, MRV should not be limited to the accounting of GHG effects but also inform

on the attainment (if possible in a quantified manner) of intended co-benefits. MRV systems are hence a key element for managing mitigation policies and increase transparency by providing the necessary information and decision-making basis for stakeholders (operators, policy makers, donors, target groups, etc.).

However, an operational MRV system itself can also create co-benefits! This can be seen in the case of the Tunisian Building NAMA, where the developed MRV system will significantly reduce the necessary efforts for processing funding requests by improving quality control at the same time.

The Tunisian Building-NAMA

The Tunisian building sector has one of the highest mitigation potentials in Tunisia. About 67% of the Tunisian population (11.2 million inhabitants) lives in urban areas [World Bank]. In total 3.3 million dwelling units exist in the whole country with an average number of persons by occupied dwelling unit of 4.2. Only 34% of all units are considered as 'modern dwelling units' [National Statistical Institute of Tunisia].

In 2015, emissions reached 7.3 million tons of CO_2eq mainly due to electricity consumption and heat generation in residential and tertiary buildings. Total gross emissions in Tunisia are in the order of 47 million tons (National GHG Inventory for the reference year 2012). While the final energy consumption from the building sector is expected to double (in absolute values) between 2010 (share: 23%) and 2030 (33%) due to population growth and increasing living standard, the potential for GHG reduction is estimated to be at least 40%.

Given the above factors, the National Agency for Energy Conservation (ANME) in collaboration with the National Electricity and Gas Utility (STEG) launched two successful incentive-based programs (**PROSOL** and **PROSOL Elec**) for the installation of solar water heaters (SWH) and photovoltaic (PV) systems. Both programs were set up to address the issue of high investment costs and high payback periods for PV and SWH. Customers from residential or tertiary buildings benefit from an investment subsidy varying from 15% to 30% (depending on the technology and size of the installed systems; subsidies are scheduled to decrease in the next years) of the investment costs as well as a bank loan, which is paid back through the monthly electricity bill. Through these programs 700 000 m² of SWH systems were installed from 2005 to 2015 as well as 25 000 kWp of PV from 2010 to 2015.

Even when successful, these two programs (PROSOL and PROSOL Elec) can only exploit part of the existing potential for SWH and PV installations in Tunisia, given the fact that they are only available for specific system sizes. Therefore ANME, with the support of the Mitigation Momentum Project from the German Ministry of Environment (BMUB), developed in 2013/2014 the **Tunisian Building NAMA**. The NAMA aims at **extending the existing incentive schemes** to smaller systems (e.g. PV < 1 kWp, SWH < 200 litres) and currently untapped markets (e.g. small scale commercial, collective housing) than included in the original version of the programs and **additionally launch an incentive scheme for thermal insulation** in new and existing dwelling units (**PROMO-ISOL**, planned to start 2016/2017). The extension of PROSOL and PROSOL Elec is supposed to significantly increase the number of new installations, in detail lead to 120 000 m² of SWH and 40 MWp of rooftop PV per year by 2020, against respectively 65 000 m² of SWH and 10 MWp of rooftop PV in 2015. The new program PROMO-ISOL shall attract house owners to equip about 13 000 dwellings per year over

the period 2016-2020 and an increased number from 2021 on. Research on new technologies, mainly on air conditioning, shall furthermore foster the introduction of highly energy efficient products to the Tunisian market.

The original programs as well as their extensions and the new insulation scheme are however linked to a **high administrative workload** for the National Agency for Energy Conservation (ANME), which already manages a large section of the registration of the systems and the financial incentives. PV installers for example, after registering for general access to PROSOL Elec, have to submit documents to ANME for each project/system in order to benefit from the financial incentives. Different departments and persons in the Agency process the incoming requests (demands) in a complex system ensuring quality control, then reply to the applicants and in the following month manage the financial flows itself. While PROSOL has a specific data management system (software) for the SWH request management, data for PV incentive applications need to be manually entered into Excel by officers, in order to ensure a certain level of digitalization and archiving. Altogether the effort for the Agency is very large, given the fact that the departments in charge are small and thousands of requests have to be processed each year (3500 requests in 2015) with **significantly increasing numbers in the coming years** in light of decreasing prices for PV as well as the extension of the existing programs and the launch of a new incentive scheme for insulation.

The MRV system of the Building NAMA

In 2015 and 2016 ANME together with the GIZ in the context of the project "Capacity building for GHG inventories and MRV in Tunisia", financed by the International Climate Initiative (ICI) of the BMUB, and in collaboration with the GIZ project "Development of the Tunisian solar market" developed an operational MRV system for the Tunisian Building NAMA.

The work included an analysis of international approaches for MRV in the building sector in order to define a comprehensive calculation methodology for GHG emissions and co-benefits, a detailed ex-ante analysis of these effects, the definition of responsibilities and data flow as well as reporting formats and verification guidance, the design and development of a specific data management system (software), purchase of adequate hardware and trainings for ANME executives on climate change aspects and the application of the new software. The MRV design was entrusted to ALCOR (Tunisia) and Ecofys (Germany) and carried out in accordance with the recommendations of the GHG Protocol Policy and Action Standard [World Resources Institute 2014]. Design and programming of the data management system (software) was undertaken by Pictor-Solutions (Tunisia). The system is ready and currently in a test phase and will officially be launched on 1st January 2017 (for administrative reasons it needs to be with the new calendar year).

The ex-ante analysis showed that **4.8 million tons of GHG emissions** can be avoided between 2016 and 2030 just through the extension of PROSOL Elec and PROSOL and the launch of the new insulation scheme PROMO-ISOL. The GHG sources considered for this calculation are illustrated in the causal chain in **figure 1**. Furthermore it is estimated that more than **16 000 additional jobs** will be created in the domestic manufacturing industry and service sector, around **2.9 billion Euro reduction of energy costs** for the end-consumer and **3.1 billion Euro reduction of public subsidies** can be achieved through the NAMA by 2030.
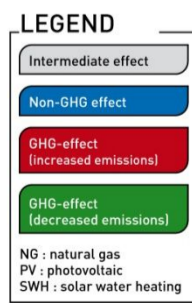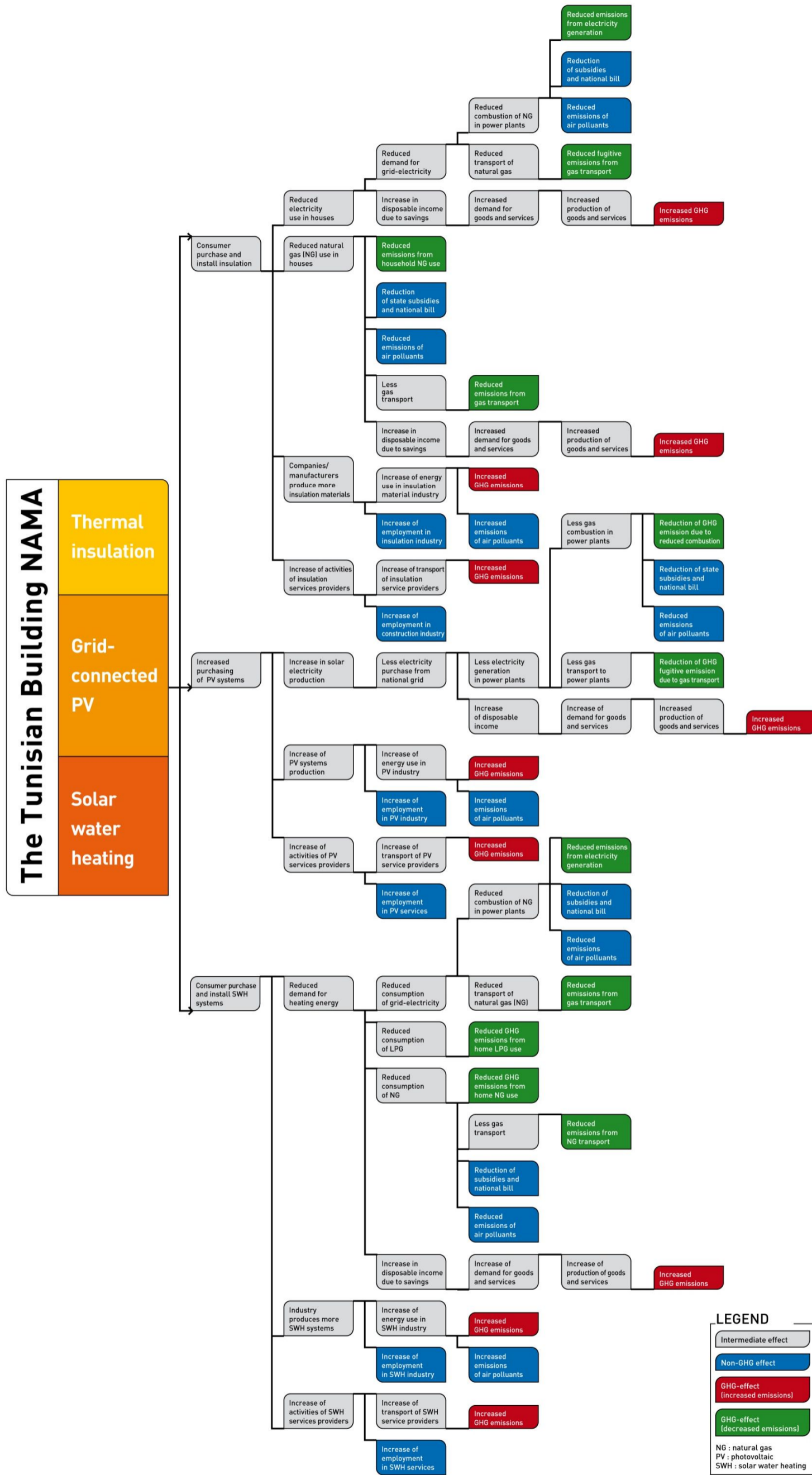
Figure 1: Causal chain of the Tunisian Building NAMA

The calculation methodologies for these impacts will be translated/inserted into a specific impact-accounting-module (**Module DEP**), which is part of the overall MRV-system. This module consists of specialized software and user-friendly interfaces. It is accessible to the Department of Studies and Strategic Planning (Direction des Etudes et de la Planification (DEP)) of ANME and allows, with a high degree of flexibility, the calculation of all indicators (GHG impacts, energy indicators, co-benefits, financial flows) related to the NAMA, ex-post as well as ex-ante. The Department of Studies and Strategic Planning has thus a powerful **tool to quantify and illustrate the NAMA impacts and manage its progress**. For the regularly data update, the Module DEP is fed by recent statistical data (electrical mix in grid, overall electricity consumption, etc.) as well as inputs from the different programs of the NAMA (PROSOL, PROSOL Elec, PROMO-ISOL). While the (few) necessary data of the PROSOL program have to be inserted semi-manually by DEP, importing data on PV installations (and later also the data from the insulation program) will be done fully automatically, given the fact that those modules are part of the same system (hardware and software).

The **Module PROSOL Elec** is, in contrast to the Module DEP, much less flexible, but on the other hand pre-defined to the legal procedures for processing inventive requests. Installers and solar companies can **register** themselves online and, after approval, **submit** their **funding demands (dossiers)** for each new PV system online on the platform by using their individual user accounts. Data is thereby already digitalized and will later be processed digitally by the executives and managers of ANME in accordance with the existing procedures. An additional hardcopy of the funding requests will solely be archived for legal purposes and only be used for

verification of the digital data sheet. The system ensures a **highly automated processing procedure** where the concerned executives and managers from the different departments use simple functions in their specific user interfaces for approval, verification, refusal, post-editing and transfer to the next officer in the procedure line. Pre-defined algorithms automatically check consistency and conformity of the applications and thereby increase quality control without replacing verification by an officer. Data storage is ensured on a server with backup on another server in case of damage of one of the servers.

The Module PROSOL Elec also includes analysis functions, for example for solar market analysis for a given year or history, and is open (can be extended) to receive data from real-time measurements from PV inverters with internet connection. It is also planned to import additional data from other stakeholders, such as the national electricity utility, in order to monitor even PV systems that are not registered for financial incentives. Currently these numbers/systems are very low but might increase in the future when the subsidies decrease.

The whole MRV (data) management system hence consist today of the Module DEP for NAMA impact analysis (with import functions for necessary data from PROSOL Elec (automated import) and PROSOL (external software)), as well as the module PROSOL Elec for the PV incentive program management. The system will be extended by a module for PROMO-ISOL (**Module PROMO-ISOL**), once this program becomes operational. **Figure 2** shows the hardware architecture of the system.

The mid-term vision of ANME and GIZ is to design the MRV systems of the other existing NAMAs in the energy sector (Cement

NMM/NAMA, Tunisian Solar Plan NAMA, Transport-NAMA) in compliance with the existing logic of the Building NAMA in terms of programming language, structure and hardware, so that all MRV systems are linked to an overall MRV system for the whole energy sector allowing overall analysis and avoiding double counting.
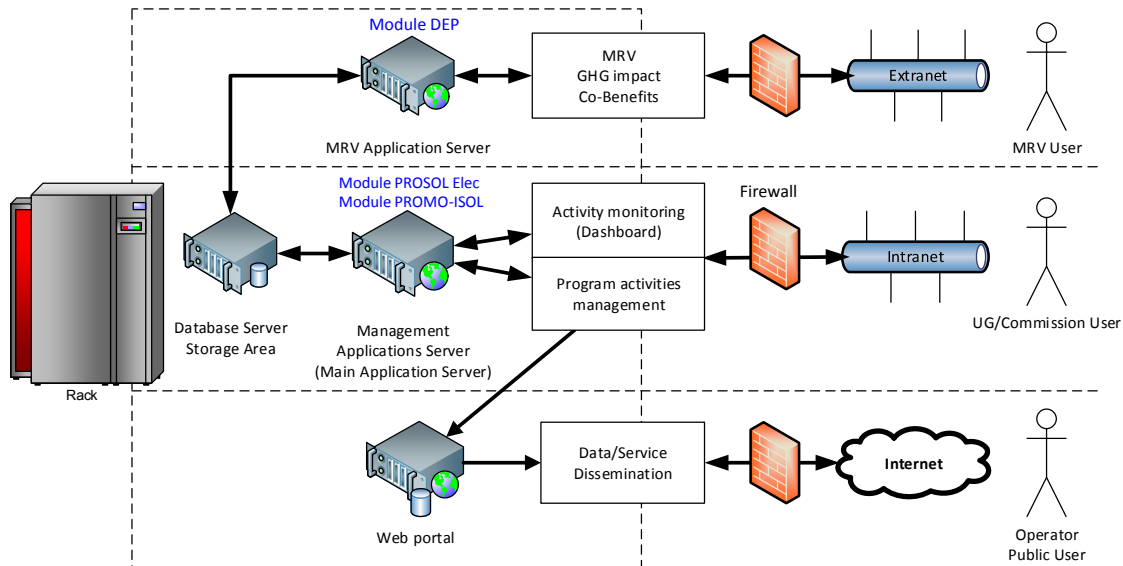

Figure 2: Hardware architecture of the MRV system of the Tunisian Building NAMA

Co-benefits of the MRV system!

The automated data processing, quality control and data storage of the Module PROSOL Elec combined with individual online interfaces for each user group, not only facilitate the work of ANME officers in terms of user friendliness and comfort, but also significantly reduce the workload required for processing funding demands. Currently, processing a funding demand for one single rooftop PV system includes 10 main steps for which different managers and executives have to invest altogether 3 working hours. The Module PROSOL Elec is supposed to reduce this effort to 1 working hour per request, corresponding to a reduction of 67%. Similarly, not only effort in terms of working hours will be reduced but also process duration, given the fact that a dossier is immediately and automatically transferred to the next officer in the process line and appearing as a pop-up on his/her computer monitor, instead of the physical transfer of hardcopies. Savings in process time are also expected to reach 67%. Through these 'simplifications', one officer in the project team could be released from processing tasks and dedicate his time to technical work on the program. In addition, manual data entry by ANME staff will no longer be required, as the data will already be in digital form (entered into the system by solar installers in order to launch a new request).

Further savings in time and workload will come from the fact that PV installers and companies can register for the general participation in the incentive program online, instead of mailing hardcopies. The general registration is done once a year at the beginning of each year in order to create an

access account for each year's incentive program/tranche before applying for financial support for specific installations.

Another benefit of the MRV system (more related to improved services instead of time/workload savings) is that solar installers and companies can follow-up their applications/dossiers online via their individual account. This was not possible previously and had to be done by phone or physical visit.

Globally, the Module PROSOL Elec allows ANME to master the challenge of efficiently treating thousands of demands for financial support (3500 in 2015 with significantly increasing numbers over the coming years), by meeting the existing standards for quality control.

The Module PROMO-ISOL will be designed in a similar manner to the Module PROSOL Elec, once the insulation program is operational. It will then be able to create the same benefits as PROSOL Elec, given that administrative processes will be similar.

The Module DEP on the other hand, even when not used to manage financial incentives and administrative procedures, allows the Department of Studies and Strategic Planning (DEP) to analyse and monitor all performance indicators of the NAMA in an efficient and effective manner. Once calculation methodologies including emission factors, types of graphical illustrations and other outputs for reporting have been defined, the module updates the calculation and outputs every time the user wishes to. Monitoring, even on a monthly basis if desired, is thereby automated as much as possible and allows DEP staff members to efficiently manage the progress of the NAMA and its measures and report to all stakeholders.

Furthermore, all modules contribute to enhanced transparency and to deliver information even to target groups which are not yet considered to be stakeholders: regularly market analyses such as the number, manufacturer and type of PV installations shall be published on the ANME website in order to inform/attract interested home owners about currently operating systems and their productivity in different geographical regions of Tunisia.

An overview of the MRV system of the Building NAMA and its functions is illustrated in **figure 3**.
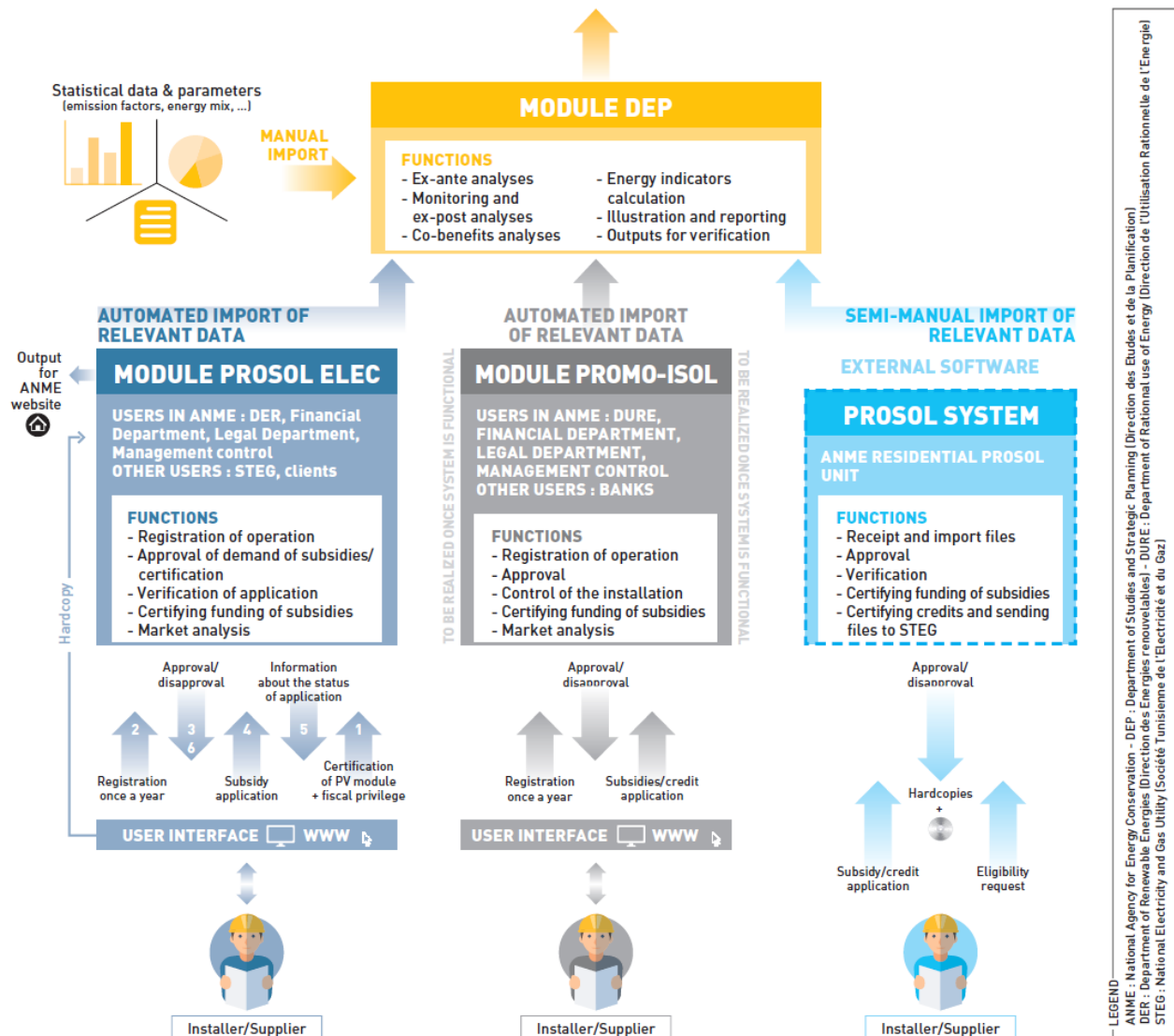
Figure 3: Schematic overview of the developed MRV system: modules, users and main functions

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