

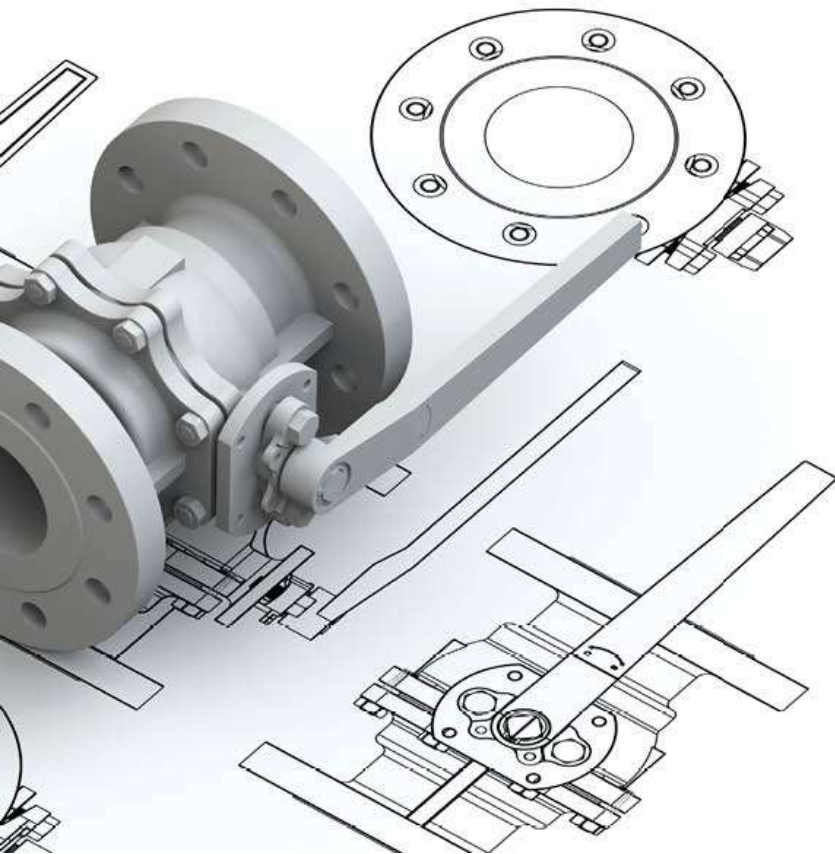
SABS:SANS 50010:2011 M&V Standard for 12-L Tax Incentives



SABS

Section 12-L Energy Efficiency Tax Incentive Workshop

Karel Steyn
SABS TC 242 – Energy Management
Convener for SABS WG's 5 & 8



Overview of Presentation

SABS

- Clarity on Some Terminology
- Background of M&V in South Africa
- Background to SANS 50010:2011
- SABS:SANS 50010:2011
 - General
 - SANS Definitions:
 - What is M&V?
 - Energy Efficiency Savings
 - M&V Approach
 - Boundary for measurement
 - Measurement periods
 - Calculation of the baseline
 - Basis for baseline adjustments
 - Measurement of Variables
 - Uncertainty
 - Some Questions & Answers addressed



Clarity on some Terminology

Some terms being used without considering differences:

- Monitoring and Targeting (M&T)
- Monitoring and Verification (“M&V”)
- Monitoring and Evaluation (M&E)
- Measurement, Reporting and Verification (MRV) – CDM process
- Measurement and Verification (M&V)

Same

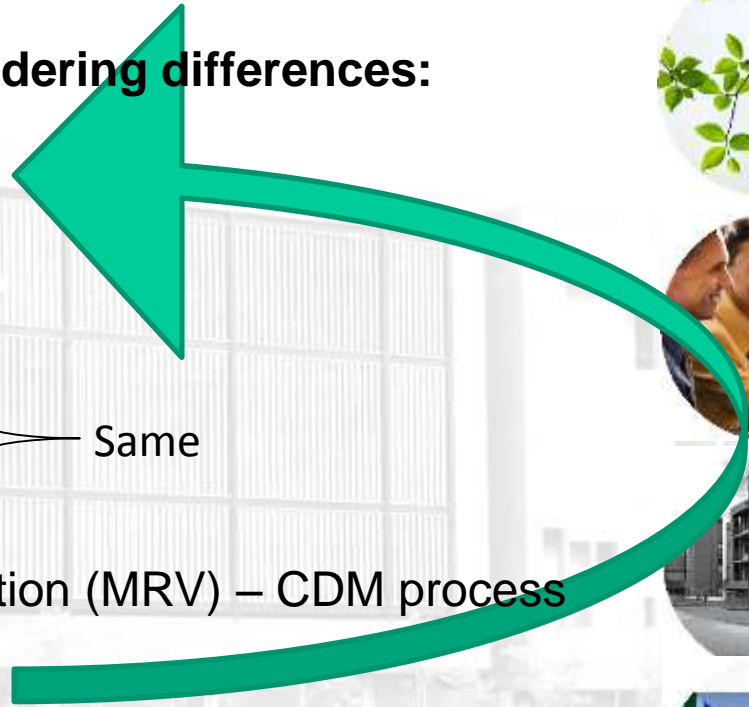


Clarity on some Terminology

Some terms being used without considering differences:

- Measurement and Verification (M&V)
- Monitoring and Targeting (M&T)
- Monitoring and Verification (“M&V”)
- Monitoring and Evaluation (M&E)
- Measurement, Reporting and Verification (MRV) – CDM process
- Measurement and Verification (M&V)

Same



M&V Background

SABS

- Started during the late 1990's as a requirement for **World Bank funding in the JV with Eskom** (ELI/Bonesa–CFL rollouts)
- Based on the **International Performance Measurement and Verification Protocol** developed and owned by the **Efficiency Valuation Organization** (www.evo-world.org)
- Used extensively/exclusively/successfully by **Eskom** for EEDSM program for the past 10 years
- SA M&V developed into world **best practice** due to:
 - **Dedicated and focus** on M&V specifically
 - Identifying and addressing many **challenges** over a period of 10 years
 - The acceptance of a **National Standard** (first in the world)
 - The development of a process for **Accreditation** of M&V bodies (first in the world)
 - **Leadership roles** in many activities throughout the world, e.g. ISO, CEM:IPEEC/GSEP, EVO, etc.



International
Organization for
Standardization

CLEAN ENERGY
MINISTERIAL



M&V Background – SANS Standard

SABS

- Initial engagements took place with NT and DoE - 2008
- SABS – TC 242
- M&V Standard initiated during 2009 due to planned provision of tax incentives for energy efficiency
 - Engagements with the EVO to use their protocol
 - **SABS WG consisted** of DoE representatives, members of the ESCO/Energy industry, representatives from interested groups and Business Unity South Africa(BUSA)
 - SABS:**SATS** 50010:2010 published late 2010
 - SABS:**SANS** 50010:2011 published for comments middle of 2011, and,
 - **SABS:SANS 50010:2011** accepted and published as a South African National Standard in **October 2011**

This standard may only be used and printed by approved subscription and freemailing clients of the SABS.

ISBN 978-0-626-26352-2

SANS 50010:2011

Edition 1

SABS

SOUTH AFRICAN NATIONAL STANDARD

Measurement and verification of energy savings

Published by SABS Standards Division
1 Dr Lategan Road Groenkloof ☒ Private Bag X191 Pretoria 0001
Tel: +27 12 428 7911 Fax: +27 12 344 1568
www.sabs.co.za

© SABS

SABS

SANS 50010:2011

SABS

- Dear SABS TC 242 Members (4 Oct 2011)
- This email serves as notification that the following standard has been **published and available as South African National Standard.**
- SANS 50010:2011 - Measurement and verification of energy savings
- The above mentioned standard is also available **for sale** from our information services department at info@sabs.co.za or from the webstore by clicking on the provided link
- <http://www.sabs.co.za/index.php?page=standardspurchase>

SABS and continuous improvement

SABS

“The SABS continuously strives to improve the quality of its products and services and would therefore be grateful if **anyone finding an inaccuracy or ambiguity while using this standard** would inform the secretary of the technical committee responsible, the identity of which can be found in the foreword.”

F.Y.I.

*Although the **M&V standard can be used as is**, the SABS TC 242 is in process of including **more information on the M&V of Greenfields (new) projects whilst reviewing the existing standard**, after which it will (again) be **published for public comment**.*

Introduction - SANS 50010

- SANS 50010 is intended to provide a **standard approach** to measurement and verification of energy savings and energy efficiency.
- This approach provides an **assurance** that actual savings should **always be more than or equal** to the reported savings.
- The methodology described in this document has been **successfully used** (in South Africa as well as internationally) to determine **not only energy but also water and demand savings**. The terminology and specific references provided throughout this document are energy specific.

Introduction - SANS 50010 (cont...)

The **methodology, process** and **calculations** contained in SANS 50010 have been developed to produce **conservative results**

FYI.

“If you don’t have a credible methodology - don’t expect credible results”

Contents

Page

Foreword

Introduction

SABS

| | | |
|---------------------|--|-----------|
| 1 | Scope | 3 |
| 2 | Normative references | 3 |
| 3 | Definitions | 3 |
| 4 | Determination of energy savings | 5 |
| 4.1 | Calculation of the baseline | 5 |
| 4.2 | Boundary for measurement | 6 |
| 4.3 | Measurement period | 7 |
| 4.4 | Basis for baseline adjustments | 8 |
| 4.5 | Energy quantities | 10 |
| 4.6 | Baseline conditions | 11 |
| 5 | Methodology of measurement and verification | 11 |
| 5.1 | Retrofit isolation | 11 |
| 5.2 | Retrofit isolation with key-parameter measurement | 12 |
| 5.3 | Retrofit isolation with all-parameter measurement | 13 |
| 5.4 | Retrofit isolation measurements issues | 14 |
| 5.5 | Whole facility | 14 |
| 5.6 | Calibrated simulation | 15 |
| 5.7 | Factors to be taken into consideration when selecting a measurement option | 17 |
| 6 | Measurement of variables | 17 |
| 6.1 | General | 17 |
| 6.2 | Energy invoices | 18 |
| 6.3 | Calibration of measurement equipment | 18 |
| 6.4 | Documentation requirements | 18 |
| 7 | Uncertainty | 18 |
| Annex A | (normative) Selection of measurement options | 20 |
| Bibliography | | 22 |

SANS Definition: What is M&V?

“The process of quantifying EE savings or the impacts by determination of **actual consumption** and **relevant energy-governing factors**, and to develop **baselines and baseline adjustments**”

[SANS 50010 (definition 3.14)]

SANS Definition: Energy-efficiency savings

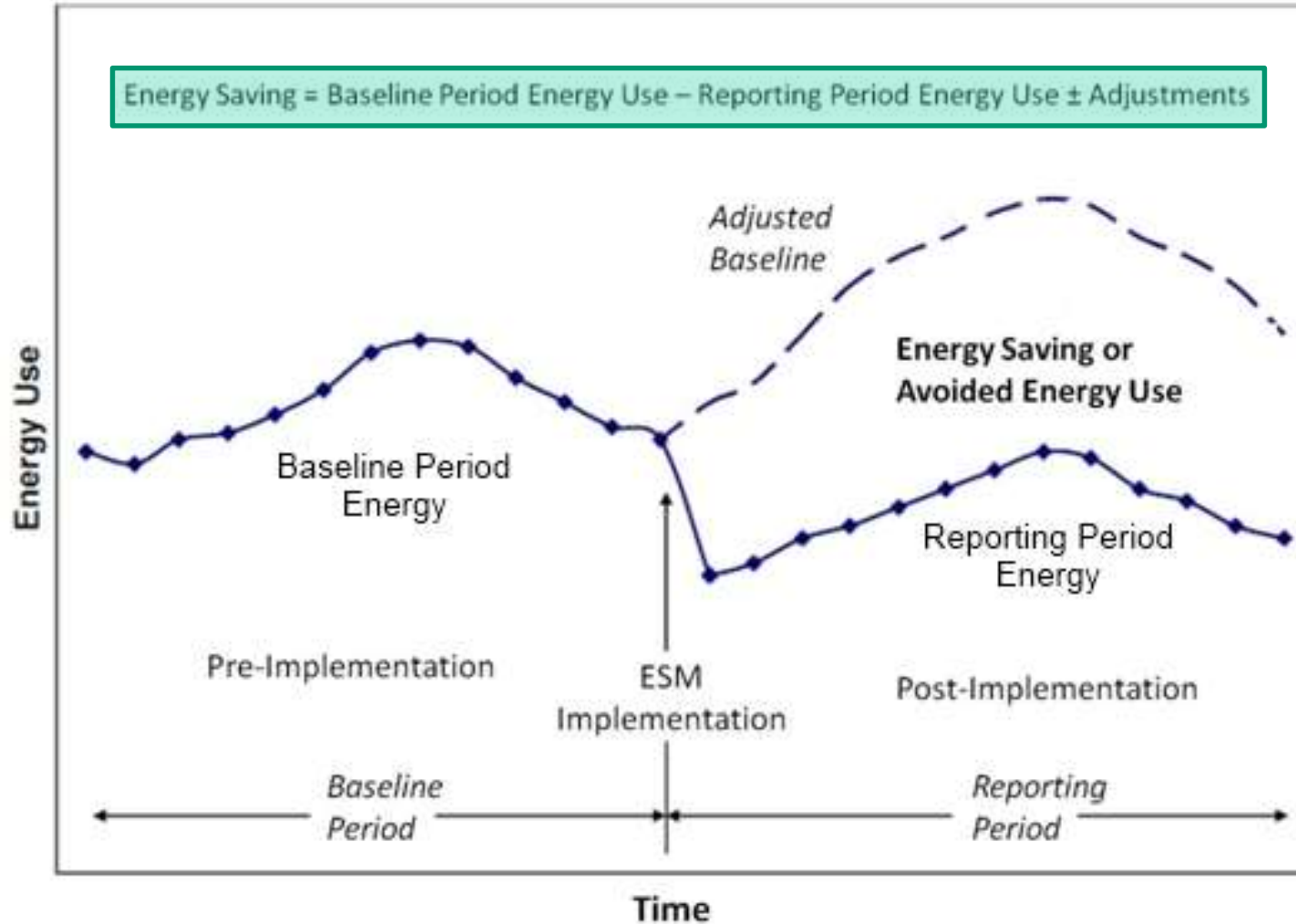
“**Difference** between the **actual amount** of energy used in the carrying out of any activity in a **specific period** and the amount of energy that **would have been used** in the carrying out of the same activity during the same period under the same conditions if the energy-savings measure was not implemented”

[SANS 50010 (definition 3.6)]

F.Y.I.

“Energy savings cannot be directly measured, since savings represents the absence of energy use.”

4.1.3 M&V Approach



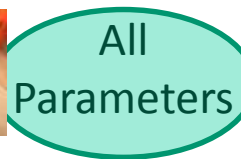
4.2 Boundary for Measurement

4.2.2 Retrofit isolation

a) Key parameter measurement – where **only key parameters relating to the energy governing factors or the energy use or both** are measured.



b) All parameter measurement – where **all parameters relating to the energy governing factors and the energy use** are measured.



4.2.3 Whole facility



4.2.4 Calibrated simulation

This option is typically used if **baseline or reporting period data are unreliable or unavailable**.



4.3 Measurement Periods

4.3.1 Baseline measurement period

- **Represent all operating modes of the facility.** This period should span a full operating cycle from maximum energy use to minimum;
- Fairly represent **all operating conditions of a normal operating cycle.**
- Include only **time periods for which all fixed and variable energy-governing factors are known** about the facility.
- Coincide with the period immediately before implementation of the energy savings measure to provide a proper baseline for **measuring the effect of just the energy savings measure.**

4.3 Measurement Periods (cont...)

4.3.2 Reporting measurement period

- The reporting measurement period **shall have at least one normal operating cycle of the equipment or facility**, in order to fully characterize the savings effectiveness in all normal operating modes.
- The **length of any reporting period** shall be determined with due consideration of **the life of the ESM** and the likelihood of degradation of originally achieved savings over time.
- The reporting measurement period may also depend on legislative or **other compliance requirements** (or both).

4.1 Calculation of the Baseline

4.1.1

Energy savings shall be determined by comparing measured use before and after implementation of a program and making **suitable adjustments for changes in conditions** (“energy governing factors”).

- NOTE: Energy savings cannot be directly measured, since savings represent the absence of energy use.

4.1.2

- Any activity has a **characteristic energy usage** before energy savings measures are implemented.
- After implementation the energy usage is reduced by a certain amount if the intervention was successful.

4.1 Calculation of the Baseline (cont...)

4.1.2 (cont...)

- Comparison between the situation before and after an intervention is achieved through the use of a baseline that characterises the energy usage based on **certain known and/or measurable input variables or patterns (energy-governing factors)**.
- This enables calculation of the savings that were achieved through energy efficiency by obtaining the difference between the **adjusted baseline and the actual energy usage**.

4.4 Basis for Baseline Adjustments

4.4.1 The requirements given in 4.4.5 shall not be used for **accessing financial incentives**.

4.4.2 **Routine adjustments:** - where energy-governing factors changes routinely, e.g. weather/production conditions.

Appropriate techniques may include constant value to parameter non-linear equations correlating to the energy governing factors

4.4.3 **Non-routine adjustments:** provides for changes in facility size, changes in shifts, changes in occupation, etc.

4.4.4 **Energy Efficiency savings:** when measuring savings under reporting-period conditions, baseline-period energy shall be adjusted to reporting-period conditions (energy-governing factors)

4.4.5 Fixed-conditions basis or normalised savings**[refer to 4.4.1 above!]**

6 Measurement of Variables

6.1.2 Determination of energy shall be **either by the direct measurement of energy flow or by the direct measurement of proxies of energy use that give the direct indication of energy use**. The energy quantities in the several forms of the energy savings equation shall be measured by one or more of the following techniques:

- a) energy supplier invoices, or measuring equipment;
- b) special meters that isolate an ESM to a system or portion of a system or facility from the rest of the system or facility;
- c) measurements shall be either periodic for short intervals, or continuous throughout the baseline or reporting periods;

F.Y.I.

Variables = Energy-governing factors

6 Documentation Requirements

6.4 The following documentation shall be made available on request during an inspection:

- a) the **scope** of the ESM;
- b) the **data** used to construct the **baseline**;
- c) **measurement points and equipment** used;
- d) the **methodology** used;
- e) the **equation(s) applied**; and
- f) **reported savings**

7 Uncertainty

7 Uncertainty shall be managed to ensure that reported savings are likely to be conservative

Exact quantification of uncertainty is not required, however, uncertainty shall be taken into account such that more accurate measurements or a more rigorous M&V process cannot invalidate the result.

In this context, invalidating a result means that **LOWER savings are reported.**

Management of uncertainty shall include

- Any values, weather measured or estimated
- The baseline period energy use,
- The reporting period energy use
- The choice of methodology
- Energy governing factors
- Estimation of interactive effects

F.Y.I.

3600kJ = 1kWh

Some Q&A?

Typical M&V Cost?

- Can be **recovered** through tax return as an expense
- **Proposed as guidance:** $\pm 5\%$ of project cost
- To be considered in context of the **wider benefits**

Some Opportunities in M&V environment:

- **Training:** Accreditation, Standards, Application, metering, etc.
- **Supply:** Equipment (all types)
- **Sub-contracting:** Equipment installation/maintenance(all types), measurements, data (collection, storage, management, evaluation, use, etc.), modelling (IT), etc.
- **Labour:** Confirmation of pre- & post- technologies, etc.



Conclusion

SABS

- SANS 50010:2011 deals with **all** the aspects required for 12-L Tax Allowance
- Lots of supporting and additional **information freely available** via the internet due to it being a world best practice
 - ENERGY EFFICIENCY MEASUREMENT AND VERIFICATION PRACTICES: DEMYSTIFYING M & V THROUGH SA CASE STUDIES.
Editor: XIA X, Publisher: Business Enterprises at Univ of Pretoria (PTY)LTD, Edition: 1ST - 2012
- Conceptually simple but could be more difficult in complex systems or applications
- Use a sound process & documentation
 - Define scope of ESM in relation to M&V
 - Define boundaries correctly (decide appropriate option to use)
 - Consider Interactive effects influencing the ESM
 - Decide on credible methodology
 - Measure correct energy use and energy-governing factors for:
 - Baseline period
 - Reporting period
 - Manage and use all data appropriately
 - Calculate and adjust baseline correctly (in relation to the energy-governing factors)
 - Deal sufficiently with uncertainty (ensure savings are not over-stated!)
- M&V presents many opportunities for participation, job creation & business



WARNING!!!!

SABS

WHO WILL ULTIMATELY BE BLAMED FOR ENERGY EFFICIENCY SAVINGS BEING REPORTED INCORRECTLY?

The M&V Professional (SANAS Technical Signatory),
employed by the SANAS accredited M&V body, is
ultimately accountable for the Energy Efficiency Savings
being reported!

BE SAFE ...



SABS

THANK YOU

