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Program Evaluation: Principles and Practices

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ABSTRACT

Government programs (initiatives) should be rigorously evaluated but seldom are. This paper outlines the application of an evaluation framework for estimating the impact of initiatives on greenhouse gas (GHG) emissions and energy (electricity, gas) demands. Victoria is a State with a high greenhouse gas intensity (1.2t CO_2e/MWh) and increasing gas and electricity prices.

The approach has been used to estimate actual energy impacts in Victoria, Australia of:

(i) the 6-star standard for new Victorian residences; and
(ii) the Victorian Energy Efficiency Target (VEET), a "white" certificate program which mandates energy retailers to acquire a specified number of accredited savings certificates for actions in energy (electricity, gas) user premises. The certificates are denominated in units of GHG emissions.

The evaluation framework applied comprises the following elements.

Additionality (incrementality)

Additionality refers to the impact of the program beyond what would have likely occurred in the targeted activity area without the measure. That is, under business-as-usual (BAU) conditions. For example, penetration of low energy lighting and overall energy efficiency improvement (EEI) without the building standards and VEET.

Rebound

Rebound refers to changes in end-user behaviour in the targeted activity area as a result of the program reducing specific activity costs. For example, increases in space comfort when a housing standard makes a house more thermally efficient and increased lighting when higher efficiency lighting is installed.

Attribution

Attribution refers to the impact on the targeted activity of the program being evaluated where more than one program targets the same activity. For example, where an initiative in Victoria other than VEET addresses solar hot water penetration.

Compliance

Compliance refers to conformance of the initiative with best practice to achieve the initiative's objectives. For example, the non-compliance of new residences with performance standards due to incorrect insulation installation.

Application of these framework elements to the 6-star standard and VEET has found that actual energy and GHG emission savings are less, often significantly, than those claimed for the initiative.

Besides estimating actual energy and GHG emissions, the evaluations can be used to estimate cost-effectiveness of the initiatives, to consider alternative approaches to achieving the initiative's objectives and to develop program improvements.

1. INTRODUCTION

Program evaluation primarily seeks to assess the effectiveness and efficiency of programs, initiatives or projects operated or proposed by entities in the public and private sectors. For senior decision makers evaluation provides information on overall program or project performance, how performance of the initiative could be improved and the actual impacts of program, initiative or project.

Rigorous evaluation, although seldom performed, is necessary to minimise misallocation of scarce resources.

Basic Program Evaluation Issues

Classes of evaluation issues	Basic evaluation questions
Program rationale (Does the program make sense?)	To what extent are the objectives and mandate of the program still relevant? Are the activities and outputs of the program consistent with its mandate and plausibly linked to the attainment of the objectives and the intended impacts and effects?
Impact and effects (What has actually happened as a result of the program as distinct from program targets. Specific impact issues, the focus of this evaluation paper, are discussed in Section 2 below.)	What impacts and effects, both intended and unintended, resulted from carrying out the program?
Objectives achievement (Has the program achieved what was expected?)	In what manner and to what extent were program objectives achieved as a result of the program?
Alternatives (Are there better ways of achieving the results?)	Are there more cost effective alternative programs which might achieve the objectives and intended impacts and effects? Are there more cost effective ways of delivering the existing program?

Program evaluation in this management framework is an element of three inter-related activities:

- planning and budgeting (decision making);
- implementing (directing); and
- monitoring, reviewing and evaluating.

Planning and budgeting involves setting goals and objectives, developing general strategies and operational plans for achieving them in light of past results, and committing resources to these ends. **Implementing** involves carrying out these plans, and the ongoing direction of the resulting operations. **Monitoring, reviewing and evaluation** involves measuring and determining the performance and results of the operations against expectations, objectives and plans. In this function **evaluation** involves the disciplined, rigorous analyses of data collected in the monitoring and reviewing activities.

Monitoring, reviewing and evaluating provide the necessary feedback between intentions and actual results and links results with planning and directing. This function involves at least four complementary processes:

- program monitoring;
- program evaluation;
- internal audit; and
- other management review and information processes (including financial reporting, performance measurement, management review and quality review).

This approach to program evaluation has been extended over the past 30 years to improve the rigour of the methodology in the areas of cost effectiveness, additionality (incrementality), rebound, attribution and compliance, each of which are defined and discussed in **Section 2** below.

Evaluation is one of a range of initiatives to improve organisation, planning and resource management with the ultimate objective of improving performance in the public and private sectors. These initiatives included:

- agency long term plans, covering projected activities and expenditures over a period, usually up to five years;
- a strategic overview, updated on an annual basis, covering the policy directions for the planning period;
- a multi-year operational plan covering activity areas and projected financial and human resource expenditures; and
- division and branch level work plans and budgets set out on a project basis covering the objectives, outputs and the planned human resources (by person month) and financial resources for each project.

2. METHODOLOGY: PROGRAM IMPACTS

Program impacts form an important element of rigorous program evaluation. Impact analysis of programs can make a significant contribution to forecasting demands, supplies and environmental impacts particularly, but not only, in the energy field. How do specific programs influence, and make a quantitative contribution (**actual, not that targeted or claimed**) to, future energy supply (non-renewables, renewables), energy demands (by energy source, sector, region, etc.) and reduced greenhouse gas (GHG) emissions?

The impact analysis must consider the following.

Additionality (Incrementality)

Additionality refers to the impact of the program beyond what would have likely occurred in the targeted activity area (for example, low energy lighting) without the measure: that is, under business-as-usual (BAU) or baseline conditions. Over time additionality will decrease for the targeted activity, such as low energy lighting (LEDs, etc.), as it becomes the market norm. The program may, however, increase awareness and implementation of energy efficiency improvement (EEI) elsewhere in the economy.

Rebound

Rebound refers to changes in end-user behaviour in the targeted activity area as a result of the program, for example increases in space comfort when a program makes a house more thermally efficient at a lower energy cost per m^2 per degree day. Rebound reduces the gross or theoretical impact of the program.

Some analysts dismiss rebound impacts due to the potential free drivers of the initiative. For example, it may catalyse increased attention to, and action on, energy efficiency improvement (EEI) and thus offset any rebound impact. In our view the specific rebound impact should be estimated and potential free drivers noted in the overall evaluation.

Attribution

Attribution refers to the impact on the targeted activity of the program being evaluated where more than one program targets the same activity. For example, where a range of initiatives aim to accelerate solar hot water penetration.

Compliance

Compliance refers to the actual performance of the program on the target activity as distinct from the performance specified in the program performance criteria. For example, the compliance of refrigerators, low energy lamps and efficiency of electric motors with standards specified in Minimum Performance Standards (MEPS); and non-compliance with building codes.

Use of the above impact analysis issues

When the above issues are addressed and program impact estimates made on applying them, program cost effectiveness can be assessed.

Cost effectiveness or cost-benefit assessment is applied by comparing the program costs (administration, capital and operating costs of the initiative) with benefits arising from the program. Both direct and indirect costs should be considered, as well as co/multiple benefits, and some form of discounting applied to future benefits and costs.

The program costs and benefits can be considered from a market (financial) viewpoint or from economic viewpoints which could include different rates of interest/discount rates and consideration of externalities, such as greenhouse gas emissions, not included in the market analysis.

3. RESULTS OF APPLICATION OF THE PROGRAM IMPACT CRITERIA IN SECTION 3 ABOVE TO TWO ENERGY INITIATIVES IN THE STATE OF VICTORIA, AUSTRALIA

The program impacts outlined in Section 3 above have been applied to two initiatives.

(i) The 5 star standard for new housing in the State of Victoria introduced in 2005 and upgraded to 6 star in 2011.
(ii) The Victorian Energy Efficiency Target (VEET), a “white certificate”/energy efficiency obligation (EEO) initiative,

for the purposes of:

(i) providing inputs for econometric modelling of State energy demands; and
(ii) advice to program managers on **actual** impacts of the initiatives.

3.1 The Victorian Residential Building Standard

The 5/6 star standard, established under the National Construction Code, sets criteria for the thermal integrity of the shell (envelope) of the residence to achieve a certain star rated **level of performance**. That is, it is not a **prescriptive** standard which would prescribe certain levels of insulation, window standards and integrity of air sealing.

In addition, but not analysed here, water use efficiency, lighting and water heating are provided for in the current 6 star standard.

The residential standard/code impact: overview for new same sized Victorian residences

2000	Estimated average annual energy use for space heating and cooling of new residences (as designed) **before** introduction of post-1992 standards	60 GJ
2016	Without the standard (6 stars) the average energy rating of new homes could have increased under BAU over 2000-16 from about 2.5 stars to about 4 stars to give an: average energy use of	45 GJ.
	Estimated 6 star (new) average annual energy use (as designed): **additionality** of 2 (6 – 4) stars	30 GJ
	Estimated 'raw' energy efficiency improvement (EEI) at same size, comfort level and compliance with design = 30 GJ	
	Rebound, that is increase in space comfort in 6 star homes: estimated at 20 per cent, would increase 6 star average energy use to 36 GJ.	
	Average as-built **non-compliance** with design, estimated at 30 per cent, increases 6 star average energy use to 47 GJ.	
	However, new rated 4 star homes, would in absence of 6 star also be subject to rebound and non-compliance with design: this would raise the 4 star energy use from 45 GJ to 45 x 1.2 x 1.30 = 70.2 GJ/year.	
	Thus, in this example the 6 star annual saving compared with a BAU residence in 2016 = (70.2 – 47) = 23.2 GJ, a 33 per cent saving, taking into account additionality, rebound and non-compliance.	

The above overview provides an indication of the energy impact (GJ/kWh/m^2/degree day) of improvements in the shell/envelope of new Victorian residences over 2000 to 2016.

Of the annual 23.2 GJ saving, average **gas** savings are estimated to be **17.2 GJ** and average **electricity** savings **6 GJ**, reflecting the predominance of gas for space heating and relatively low **energy use** (GWhs) for space cooling in Victoria (peak demands, GWs, are however significant).

A complete rigorous program evaluation would refine these estimates and consider:

(i) annual variations in savings;
(ii) analysis of benefits and costs;
(iii) alternative approaches to achieving the 6 star objectives; and
(iv) how the program could be improved. For example, by improving compliance and including in the standard a 6 star MEPS for space heating and cooling equipment and efficiency standards (lumens/watt and watts/m^2) for lighting. Improving compliance and including fixed equipment standards may be a lower cost route to achieving a 6 star performance measured in GJ, kWhs or CO_2e/m^2/degree day.

Building Standards for New Residences

Building standards for new homes have been significantly tightened in Victoria since 2000, resulting in lower energy demands (GJs, MWhs, kW) per m^2 per degree day. In terms of actual energy use per new residential unit, this improved thermal performance design using standards based on an accredited rating tool has been offset to some extent by increases in conditioned floor area, increased space comfort levels and **as-built** non-compliance with the pre-build design on building permits. For example, incorrect installation of insulation and lack of adequate attention to air infiltration. A particular instance of incorrect insulation installation is referenced below.

"*The AS/NZS 3000 standard requires 50 millimetres of insulation horizontal ceiling clearances for incandescent downlights and 200 millimetres for a halogen downlight (which has a transformer).*

In practice insulation installers often leave 450 millimetres around each halogen downlight (typically one per 2.5 m^2), meaning that in a 10 m^2 room 0.81 m^2 of ceiling is uninsulated. Heat loss through the uninsulated part of the ceiling will double the heat lost through the whole ceiling, reducing effective R-value of R3.5 insulation to R1.2. For best practice in code compliance downlight covers (isolites, muffins) are available that may allow insulation to be installed up to the side of the cover. However, these are rarely used." (pp. 55-56, CSIRO 2013)

Compliance, **as built**, with designs to meet standards is a significant issue.

The compliance issue in Australia has been the subject of two respected reports, one by the Commonwealth Scientific and Research Organisation (CSIRO) for the Federal Department of Industry and one by pitt and sherry and Swinburne University of Technology for the (State) Government of South Australia. The reports address the significant non-compliance of new residences with the mandated building code. This non-compliance results in higher energy demands and thus higher operating costs for residents/householders and higher greenhouse gas emissions than would be the case if these new residences complied with code requirements.

Despite the findings of these reports and their implications, thus far there appears to be little improvement in building practices and no policy interest in taking action to remedy the situation. This is very surprising and worrying given the implications of this widespread non-compliance with the mandated code.

Key findings from the CSIRO study are summarised below.

Some key CSIRO study results

Rating results: Melbourne, Victoria's capital (Climate Zone 6)	
Original design rating:	97 per cent ≥5-stars.
Re-rating (tests on completed residence)	31 per cent ≥5-stars, that is, of the sample (104 residences) 69 per cent did not comply. 17 per cent <4-stars. Over time (2003 to 2010) as rating requirements increased compliance decreased.
Meeting star rating requirements: Melbourne	
Insulation:	16 per cent in poor condition. Large gaps left around downlights (safe light fitting coverings rarely used): see above. Internal wall insulation rarely used.
Double glazing:	13.3 per cent in ≥5-stars. 28 per cent of home owners thought they had double glazing.
Weather sealing:	20 Melbourne homes blower-door tested. 10 to 15 ACPH at 50 Pa is the recommended guideline. Average of tested homes 19.7 ACPH at 50 Pa. Only one home had <10 ACPH at 50 Pa.
Lighting:	81 per cent had inefficient halogens; 66 per cent thought they had efficient lighting.

Two very important aspects of the CSIRO work are:

- The sample/cohort houses were re-rated **by physical testing** after construction and the re-rated star-rating results compared with the **design** star ratings. We have been arguing the need for post-construction physical testing over the past 10 years. Re-rating in the future would preferably be undertaken, at a specified internal temperature, after construction completion but before occupation.
- It provides a sample/cohort of houses that can be monitored over time for energy use trends in these houses as they are modified, equipment/appliance use changes, weather changes and occupation characteristics change.

A key finding of the pitt and sherry/Swinburne study is that the building industry perceives little risk that cutting corners on energy performance will be discovered or, if it is, that there will not be any serious consequences. Inspection of completed buildings is not rigorous.

Over 2000 to 2016 we estimate that the application of **new** building standards **reduced space conditioning use/m^2** per degree day by about 30 per cent **not** by 50 per cent as designed. This reduction in savings was due to non-additionality, non-compliance with design and rebound, even as mandated star ratings increased from about 2 in 2000 to 5 in 2005 and 6 in 2011.

The shortfall between a new residence design and as-built energy performance has been noted by the International Energy Agency (IEA) and in the United Kingdom where it is known as the Energy Performance Gap (EPG).

3.2 The Victorian Energy Efficiency Target (VEET) Marketed as the Energy Saving Initiative (ESI)

Introduction

The purpose of VEET, a "white certificate" energy efficiency obligation (EEO) program, is to promote the reduction of greenhouse gas emissions by encouraging the efficient use of electricity and gas in the residential and business sectors, and to foster investment, employment and technological progress in industries that supply goods and services which reduce energy consumption.

Tradeable Victorian Energy Efficiency Certificates (VEECs) are awarded according to a VEET schedule for each VEET activity, such as replacement of inefficient lighting (see Table 1 below). VEECs are tradeable and each VEEC represents one tonne of carbon dioxide equivalent of greenhouse gas abated. Gas (GJs) and electricity (MWhs) associated with each tonne of CO_2e are specified. VEECs are created by Accredited Certificate Providers (ACPs) who mainly sell the VEECs to liable (relevant) entities. Relevant entities are gas and electricity retailers who have VEET liabilities according to their share of gas and electricity sales, proportioned to the annual target. A 10 per cent market share in 2015 would have given rise to a 540,000 VEEC liability.

Most VEECs have been deemed. That is, VEEC quantities are available in the year of installation for savings over the life (5 to 20 years) of the activity.

In 2015 the VEET was 5,400,000t CO_2e; VEECs (VEET certificates) created were 5,794,168; VEECs registered/accredited and acquitted under VEET were 5,573,897. VEECs of 4,993,000 were created in 251,700 households (about 10 per cent of 2015 Victorian households). In over 11,000 business and other non-residential premises; 801,000 VEECs were created in 2015. The most common activities undertaken by accredited creation entities in 2015 were lighting activities – over 90 per cent of VEECs registered. Downlight replacements alone gave 4.1 million VEECs in 2015. Next, at 208,590 VEECs, were water heating activities (data from VESC 2016). The VEET will increase to 6.5 million VEECs by 2020. VEET is promoted as the Energy Saver Incentive (ESI).

Details of VEET regulations and guidelines are summarised in **Chapter 2** of the 2016 Performance Report. **Chapter 3** outlines VEET operation and performance in 2016. As of 31 December 2015, there were 187 accredited VEEC creators.

Technological improvements have been significant in energy efficient lighting. Initially by compact fluorescent lamps (CFLs) and more recently by LED lighting. These developments have reduced the cost of energy efficient lighting which, together with value of VEECs, availability of replacements for relatively efficient halogen lighting and creator experience, allowed consumers to receive lighting upgrades at little or no cost through VEET.

In 2015, VEET Schedule 21A Lighting replacement, each installation created 10 VEECs on average and a Schedule 34 lighting upgrade installation (commercial sector) created 178 VEECs on average. Average VEEC price in 2016 was about A$20, but has since declined to A$14 to A$16 as the VEEC surplus grows.

Over the life of a VEET activity, for example LEDs replacing less efficient lights, additionality of the targeted activity will decline, perhaps to zero, as the VEET activity becomes the market norm.

The uncertainty of additionality, attribution, rebound and compliance assumptions for VEET activities remain issues for determining the actual energy and climate change impacts of the VEET.

VEETs, 2015 to 2020 annual targets

Year	Target
2015	5.4 million tCO_2e
2016	5.4 million tCO_2e
2017	5.9 million tCO_2e
2018	6.1 million tCO_2e
2019	6.3 million tCO_2e
2020	6.5 million tCO_2e

Although the annual targets may be attained on the basis of accredited VEECs created, the **actual** annual impacts of VEET on energy consumption (electricity and gas) depend on additionality, attribution, rebound, compliance and overall impacts of VEET activities.

For example, with electricity saving activities at 94 per cent of VEECs (gas 6 per cent) valued at the marginal Victorian electricity intensity of 1t $CO_2e \approx 1$ MWh and an average 10 year activity life the electricity impact claimed in 2016 **of 2015 activities** (full year of 2015 VEET installations) would be **if the target were attained**:

$5.4 \times 0.95 \times 1 \times 0.1 \times 10^3$ GWhs

$= 0.513 \times 10^3$ GWhs

= 508 GWhs

when the Victorian end-use electricity consumption (NIEIR December 2015) in 2016 was 40,300 GWhs, a VEET impact of -1.26 per cent without taking additionality, etc. and pre-2015 activities' impacts into account.

We discount the target electricity impact of 2015 VEET activities by 50 per cent, that is, in 2016 to 254 GWh, which would reduce the impact on Victoria's 2016 electricity consumption of 2015 activities to -0.63 per cent.

2015 VEET activities, the number of VEET installations and VEECs registered[1] for each activity, the registered VEECs per installation and comment on each activity's likely **actual** impact status are presented in **Table 1** below (2015 VEET performance report is the latest, as of June 2017, available).

Table 1. 2015 VEET activities

Activity	Installations	VEECs registered	Registered VEECs per installation	Comment: impact value risks
Water heating				
1A Decommissioning electric and installing gas/LPG storage	373	16,454	44.11	–
1B Decommissioning electric and installing gas/LPG instantaneous	2,727	111,659	40.95	–
1C Decommissioning electric and installing electric boosted solar	0	0	0	Attribution –State, Federal
1D Decommissioning electric and installing gas/LPG solar	0	0	0	Attribution – State, Federal
1E Electric boosted solar replacing electric	1,129	44,258	39.6	Attribution – State, Federal (relation to IC?)
1F Gas/LPG boosted solar replacing electric	187	11,059	59.13	(Relation to IC?)
2. Installing solar retrofit on electric	0	0	0	–
3. Decommissioning gas/LG and installing gas/LPG boosted solar	235	2,688	11.44	Attribution –State, Federal

[1] Created VEECs must be registered with the Victorian Essential Services Commission (ESC) before they can be acquitted against relevant entities' liabilities. Some created VEECs are not eligible for registration and there are some registration lags.

4. Installing solar pre-heater on gas/LPG	0	0	0	–
Space heating and cooling				
5. Decommissioning ducted heating and installing high efficiency ducted gas	1,275	15,577	12.22	Rebound
6. Decommissioning central electric resistance and installing high efficiency ducted gas	187	47,015	251.42	Rebound
7. Decommissioning ducted air to air heat pump and installing high efficiency ducted heat pump	0	0	0	Additionality if end of life
8. Decommissioning central electric resistance and installing high efficiency ducted heat pump	3	571	19.3	Additionality if end of life
9. Installing flued gas/LPG space heating	389	3,295	8.47	–
10. Installing air to air heat pump	0	0	0	–
20. Installing a high efficiency ducted gas heater	120	679	5.66	–
23. Decommissioning refrigerated air conditioner and installing evaporative cooler	0	0	0	–
28. Replacement of gas heating ducts	824	221	0.26	Rebound
11. Installing insulation in ceiling area not previously insulated	0	0	0	–
12. Installing insulation in floor area not previously insulated	0	0	0	–
13. Replacement of external window	0	0	0	–
14. Retrofit of external window	0	0	0	–
15. Weather sealing	22,336	32,646	1.46	Compliance, additionality
Lighting				
16. Installing low energy lamps	0	0	0	–
21A Lighting – efficient GLS lamps	32,668	334,111	10.22	Additionality
21B Installing low energy reflector lamp replacing incandescent reflector lamp	8,338	570	0.07	Additionality
21C Installing a low energy lamp replacing a 12 volt halogen lamp	186,509	3,860,935	20.7	Additionality

21D Installing a low energy downlight fitting replacing existing 12V halogen downlight	11,816	148,428	12.56	Additionality
34. Undertaking a lighting upgrade	1,635	290,768	177.84	Additionality
Shower roses				
17. Shower rose replacement	21,560	74,394	3.45	Compliance
Refrigerators/freezers				
18/22 Purchase of HE refrigerator/freezer	23	47	2.1	Additionality
19. Destruction of refrigerator/freezer	11,053	56,943	5.15	–
Standby power controllers				
29. Installing standby power controller	3,230	8,286	2.57	Compliance, additionality
Other activities				
24. Purchase of high efficiency TVs	8,032	41,568	5.17	Additionality
25. Purchase of high efficiency clothes dryers	7	27	3.86	Additionality
26. Installation of high efficiency pool pump	111	878	7.91	Additionality
30. Installation of in-home display (IHD)	14,700	22,955	1.56	Compliance
31. Installation of high efficiency motor	0	0	0	Additionality
32. Installation of high efficiency refrigerator display cabinet	0	0	0	Additionality
33. Replacing refrigerator fan	0	0	0	–
35. Low flow trigger nozzle	0	0	0	–
36. Water efficient pre-rinse spray valve	0	0	0	–
TOTAL	**329,485**	**5,126,758**	**15.56**	

Notes: Created VEECs are assessed against criteria in the legislation before being validated and registered. This accounts for the difference between created and registered VEECs; generally created VEECs as per the regulation schedule are greater than registered VEECs. Some claimed created VEECs are invalidated due to non-compliance with creation regulations and there are lags in registration. Table sourced from the 2015 Victorian Essential Services Commission, VEET performance report.

4. CONCLUSIONS: CONCLUDING COMMENTS ON EVALUATION OF THE PROGRAM IMPACTS

The evaluation of program impacts examined the additionality, rebound, attribution and compliance of two State initiatives in Victoria (Australia). The results of these evaluations of program impacts are summarised below.

1. The Victorian residential building code

This code/standard in its application to thermal performance has been upgraded several times since the 1990s, most recently in 2011.

Two major studies on the standard, conducted over 2012-13, indicated compliance deficiencies in implementation of the code, deficiencies which do not seem to have yet been rectified. Particular deficiencies identified were inadequate attention to insulation instalment and air infiltration, inadequate regard to best practice and inadequate building inspection after construction. These compliance deficiencies could increase annual space conditioning energy use (GJs/MWhs per m^2 per degree day) by at least 30 per cent for a household with specific characteristics.

2. The Victorian Energy Efficiency Target (VEET)

VEET is a white certificate (energy efficiency obligation) initiative which commenced in 2009 and is currently slated to terminate in 2020. It is implemented through tradeable Victorian Energy Efficiency Certificates (VEECs) for specified VEET activities; for example, replacement of low efficiency lighting with high efficiency lighting such as LEDs. Electricity and gas retailers are liable annually for purchase and acquittal of VEECs in proportion to their annual sales. Over 2009 to 2017, electricity saving VEECs have dominated (94 per cent) VEET. In determining **actual** VEET impacts, additionality and rebound have been major issues and for some activities compliance and attribution.

In analysing these issues we (SCR, NIEIR) estimate a 50 per cent reduction in the VEET impact targeted/claimed.

For both the initiatives, because of the lack of detailed data on implementation of the initiatives, a low level of confidence is placed on the impact analysis results.

Despite, however, the deficiencies identified for the two initiatives, they have contributed to awareness and implementation of overall energy efficiency improvement (EEI) in the State of Victoria, Australia.

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