Education Report: Budget 2020 – Supporting the Replacement of Coal Boilers in Schools

To: Hon Chris Hipkins, Minister of Education  
Date: 19 November 2019  
Priority: High  
Security Level: Budget Sensitive  
METIS No: 1210381  
Drafter: Richard O’Reilly  
Key Contact: Sharyn Piltrow  

Purpose of Report

You have requested further advice on the replacement options for coal boilers in schools, to inform costings and assumptions for the associated Budget 2020 bid. This briefing provides you with that advice on the progressive removal and replacement of coal boilers across the entire state school property portfolio.

Summary

- You have requested further advice on the replacement options for coal boilers in schools. The Ministry has worked with the Energy Efficiency and Conservation Authority (EECA) to produce more accurate costings to inform the associated Budget 2020 initiative. This initiative is part of the broader Just Transitions package.

- Based on our work with EECA, the Ministry has developed a preferred approach to prioritising alternative heating methods to convert or replace coal boilers.

- The Ministry recommends that coal boilers be converted to, or replaced with, wood, electric or gas heating systems, and in this preferred order. Each alternative heating method represents a significant reduction in emissions when compared to coal.

- Separately, the Ministry of Business, Innovation and Employment (MBIE) and EECA are leading a Budget 2020 bid focused on State Sector Decarbonisation. We see value in pursuing a joint bid with MBIE as the coal boilers initiative sits within the scope of the wider State Sector Decarbonisation Programme.

- All Budget 2020 bids are due to be submitted to Treasury on 29 November.
Recommended Actions

The Ministry recommends that you:

a. note the Ministry is currently progressing a Budget 2020 bid for approximately to deliver a phased programme to upgrade or replace all coal boilers across the school property portfolio.

b. note the advice on the comparative benefits of the various coal boiler replacement options.

c. note that MBIE and EECA are progressing a broader bid focused on State Sector Decarbonisation, which overlaps with the Ministry’s coal boiler replacement bid.

Noted

d. agree to a joint Budget 2020 bid between MBIE and the Ministry for the replacement of coal boilers in schools to be progressed through the State Sector Decarbonisation Programme.

Agree / Disagree

e. agree that the timing for proactive release of this briefing will be determined by decisions through Budget 2020.

Agree / Disagree

Sharyn Pilbrow
Acting Head of Education Infrastructure Service

Hon Chris Hipkins
Minister of Education

19/11/19

26/11/19
Background

1. The Ministry has previously provided you with advice on coal boilers across the school property portfolio and options for their replacement (METIS 1146099). We have also provided initial advice on a related Budget 2020 initiative, presenting high level costs, and outlining the challenges to effectively rolling out a nationwide replacement programme (METIS 1208192).

2. You have requested further advice on the Budget 2020 initiative, and a comparison of the range of alternative heating systems to coal boilers.

3. This briefing provides a revision of overall costs, new analysis and related information. This advice is informed by analysis undertaken with the Energy Efficiency and Conservation Authority (EECA) to better determine options and costs for coal boiler replacements across 210 state schools (see Appendix One).

4. Separately we have met with EECA and the Ministry of Business, Innovation and Employment (MBIE) to discuss the Budget 2020 State Sector Decarbonisation Programme, led by the Minister of Energy and Resources with support from Just Transitions Ministers (chaired by Minister Parker). There is significant overlap between the coal boiler replacement programme and the State Sector Decarbonisation Programme.

Replacement options

5. Each replacement option or alternative heating system EECA has identified has different cost implications (both capital and operating), economies of scale and environmental benefits. However, the key takeaway is that schools could achieve a significant reduction (between 40-98%) in carbon emissions by shifting away from the use of coal for heating.

6. EECA’s recent analysis (Appendix One) shows that the options with the lowest emissions actually use wood, followed by all electric options and then LPG and gas. This is also supported by an ECCA pilot project that ran from 2007-2010, which found coal boilers converted to use wood were the most sustainable and cost effective option for a number of schools that had coal boilers.

7. Unlike electric heaters and heat pumps, wood boilers utilise existing coal boiler infrastructure like reticulated water heating systems, which if replaced entirely across all state schools, would create large and unnecessary amounts of waste that would be expensive to remove and dispose of. Wholesale replacement would also generate embodied carbon in the manufacture, transport and installation of entirely new systems.¹

8. Although wood boilers utilise existing boiler infrastructure and are less capital intensive than other options, the operational costs for wood are higher than for coal. Likewise electricity, LPG and gas systems will likely have higher operational costs than coal. Our Budget 2020 bid seeks operational funding to meet these additional costs in order to avoid creating an undue burden for schools.

Recommended prioritisation of replacement options

9. The Ministry will use the alternative technology options below (and in Appendix One) to replace or convert 200 coal boilers, out of the 210 ‘active’ coal boilers across state schools. It is assumed that some boilers will otherwise be replaced through business as usual processes, as they reach the end of their useful life during this programme.

¹ The EECA analysis in Appendix One does not factor in emissions from fuel and the manufacture, transport and installation of alternative heating systems.
10. School-specific circumstances (e.g. climatic conditions) mean that any combination of alternative technology options below may be required. The Ministry has prioritised each option, with its emissions as the key overarching consideration:

<table>
<thead>
<tr>
<th>Option</th>
<th>Rationale</th>
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<tbody>
<tr>
<td>1st Preference: Convert/replace with wood pellet boilers</td>
<td>Wood pellet boilers have the lowest emissions factor, can be connected to existing hot water distribution systems, and wood pellets are energy dense, requiring little additional storage space.</td>
</tr>
<tr>
<td>2nd Preference: Convert/replace with wood chip boilers</td>
<td>Wood chip boilers would deliver similar benefits to wood pellet boilers, but they require larger storage facilities as wood chips are less efficient than pellets.</td>
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<tr>
<td>3rd Preference: Replace with electric heating systems</td>
<td>While the national grid produces mostly clean energy, the emissions factor of electric systems is higher than wood, and these systems generally have more regular and expensive maintenance requirements.</td>
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<tr>
<td>4th Preference: Replace with natural gas or LPG systems</td>
<td>Because of natural gas or LPG’s higher emissions factor compared to the options above, it would only be installed where any of the previous options were not practical.</td>
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11. Decision making criteria will also be developed, based on this prioritisation of options, to ensure consistent implementation across the portfolio.

Budget costs and phasing

12. The Ministry is currently seeking $9.2(2)(i) through Budget 2020 to fund the replacement programme. This is based on operational costs of $9.2(2)(i) and capital costs of $9.2(2)(i). Approximately half the operational costs are for capital charge and depreciation, with the remainder for energy audits, feasibility studies, increased operational costs to schools and additional Ministry staff.

13. The capital costs are phased to progressively scale-up investment over five years. They also assume an average cost for 200 coal boilers that will be replaced or converted. In the Ministry’s experience, capital costs can range from less than $9.2(2)(i) for boiler conversions to $9.2(2)(i) where entire boilers are replaced and their replacement is complicated by supporting infrastructure.

State Sector Decarbonisation Programme

14. The Ministry has been discussing the ‘State Sector Decarbonisation Programme’ with MBIE. MBIE are preparing a budget bid for the programme that will be led by the Minister of Energy and Resources.

15. The State Sector Decarbonisation Programme would provide funding and implementation assistance to enable agencies (including hospitals and schools) to deliver low-emissions investments. The intention of the initiative is to allow agencies to deliver these investments without needing to compete with core service delivery.
16. The key elements of the proposed initiative are as follows:

a. Funding for energy audits. EECA will provide co-funding for State sector organisations to conduct energy audits to identify opportunities to reduce energy emissions;

b. Dedicated capital funding for energy projects that reduce carbon emissions, e.g. efficient lighting, replacing coal boilers with low-emission options such as heat pumps or wood fuelled boilers;

c. Promotion of successful low-emission technologies to catalyse wider uptake, including by the private sector.

17. The State Sector Decarbonisation Programme will focus on decarbonisation opportunities across the State Sector. The Ministry is linked in with this work in terms of sharing information to ensure costings and assumptions are consistent across bids.

18. We recommend that a joint bid is progressed between MBIE and the Ministry. We see a number of benefits to this approach and believe combining our efforts will give the bid a stronger chance of success. Taking forward a joint bid would also minimise duplication of state sector decarbonisation efforts.

Next steps

19. The Coal Boilers Budget bid sits within the Just Transitions priority package. The Just Transitions package is due to be submitted to the Minister of Finance by 6 December 2019.

20. Pending your approval to the approach outlined in this Education Report, we will look to integrate this work within the broader State Sector Decarbonisation Programme.

Proactive Release

21. Agree that the timing for proactive release of this briefing will be determined as part of decisions through Budget 2020.