Meeting with Rio Tinto

Friday, 28 April 2023

Meeting purpose

Rio Tinto CEO (Jakob Stausholm) has requested a meeting with Treasury to discuss observations on the commodity market, local industry, international commodity trade, geopolitical matters, and his views on the global and domestic decarbonisation effort.

Rio Tinto is one of the biggest electricity users in Australia through its large aluminium smelting operations. The sector is a major focus in decarbonisation efforts.

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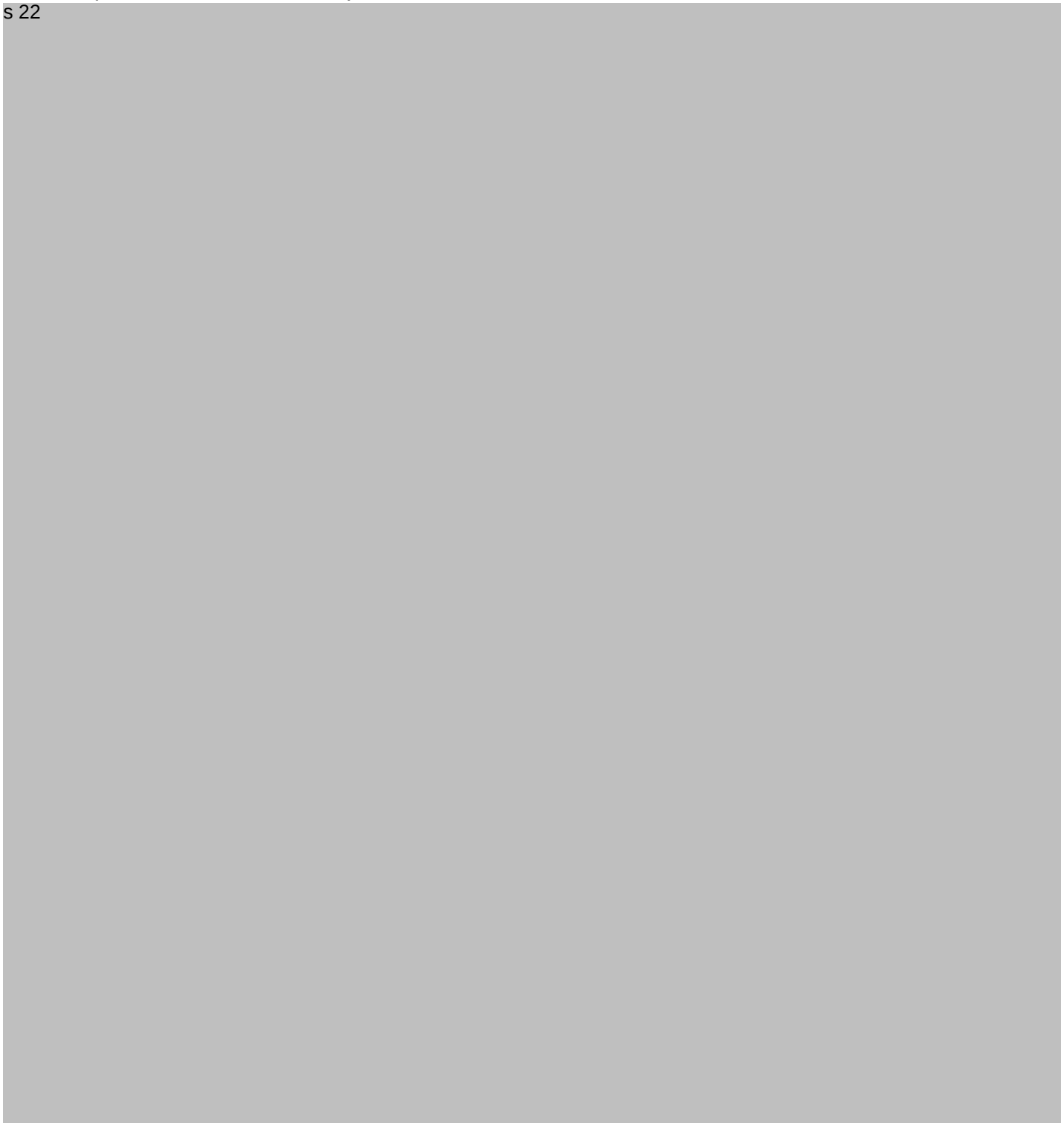

Key issues

Decarbonisation and the Safeguard Mechanism

- Rio Tinto has been a participant in the Australian Industry Energy Transition Initiative, which in February released a report on sectoral decarbonisation pathways for heavy industrial supply chains, including steel and aluminium. These pathways outline the costs and technologies of decarbonisation and identified key challenges and enablers across five supply chains and the broader energy system.
- Sectoral pathways are being considered within government and called for by industry, to guide future policy and investment decisions.
  - The Treasurer met with the Investor Group on Climate Change (IGCC) on Friday 21 April. Investor participants highlighted the need for sector-specific pathways and targets to guide investment for an orderly and just transition to net zero.
  - Separate government processes are underway to develop sectoral pathways, s 47C

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SB23-000050

CLIMATE MODELLING

Headline Statement

- As part of the 2022-23 October Budget, the Government provided $29.8 million over four years and $6.9 million ongoing to restore Treasury's role in modelling climate risks and opportunities for the Australian economy.

Key Points

- The Government's October 2022-23 Budget funded a significant capability uplift within Treasury, including the establishment of a new Climate and Industry Modelling Branch within Macroeconomic Group.
  - This delivers the Government's election commitment, under the Powering Australia plan, to restore Treasury's role in modelling climate risks and opportunities for the Australian economy.
- The quantum of funding received ($29.8 million over four years, and $6.9 million ongoing) ensures that Treasury is sufficiently resourced to model and advise on the various impacts of climate change and the Government's wide-ranging climate policy agenda.
  - The new function is expected to be fully staffed (around 30 ASL) by the second quarter of 2023.
- Treasury last engaged in a large-scale climate modelling exercise – focussed primarily on mitigation – almost a decade ago.
- Work is well underway on developing the analytical and modelling capability that Treasury will need to provide economic advice on the breadth of climate-related questions facing government.
- Once restored, Treasury's modelling capability will allow for the incorporation of longer-term climate impacts into a range of government decision-making and publications, including future Budgets and Intergenerational Reports.
  - The October 2022-23 Budget laid the groundwork for this, identifying the numerous channels climate change can impact Australia's economy and

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Last updated: 17/05/2023 4:49:00 PM

fiscal position. This will be built upon and expanded in future Budgets and this year's Intergenerational Report.

- In establishing this new capability, we are working closely with domestic and international experts from government, academia and the private sector.
  - This includes drawing on advice through an external expert advisory group, which we are in the process of establishing.
  - We will also look to procure specialised data and models where these can supplement internal capability building (for example, climate risk data).
    - : Treasury's contract with Deloitte (valued at $167,000) represents an early part of this process. In recent years, Deloitte has developed significant capability in modelling the impacts of climate change policy and the physical risks of climate change. Treasury is looking to learn from this experience.
- We are co-ordinating closely across government – with DCCEEW, DISR, PMC, CSIRO, and many other agencies – given climate change touches most policy portfolios in one way or another.
  - This will ensure Treasury's restored capability, which targets economic modelling and analysis, complements the scientific and policy program delivery responsibilities and development plans of other agencies.

Background

- The October 2022-23 Budget measure to "restore Treasury's role in modelling climate risks and opportunities" supports:
  - The establishment of the Climate and Industry Modelling Branch.
  - Approximately 30 Treasury ASL to ensure delivery of capability and analysis at a pace consistent with the implementation of the Government's climate agenda.
  - Access to data and specialist expertise from academia and the private sector, to support the capability build including immediate priorities.
  - Enhanced information technology to facilitate modelling and data analysis.
- The Branch is composed of four units.
  - The global macroeconomic modelling unit will provide advice on the impacts of international mitigation policies, global climate shifts, and market regulatory shifts on the Australian economy.
  - The domestic macroeconomic modelling unit will provide advice on the impacts of domestic mitigation and adaptation, and physical climate effects, on Australia's economy, budget, industries and households.
  - An industry modelling unit and separate regional modelling unit will provide advice on the effect of domestic mitigation and adaptation, and physical climate effects , on Australian sub-sectors and regions.

The challenges of climate modelling

- Modelling climate change – particularly climate change impacts (physical risks, costs) – is highly complex, and an evolving field of economics.
  - The impact of climate change and transition (mitigation and adaptation) on the size and structure of the Australian economy will depend on evolving factors (e.g. demand shifts, other countries' actions, technological developments and policy timing).
  - There are numerous impact transmission channels: direct (e.g. physical effects) and indirect, (e.g. the flow-on effects of global transition to reduce emissions).
  - Adding to the complexity, climate change impacts are, and will remain, heterogeneous across Australian regions.
  - Single-model exercises only capture certain of these elements.

Deloitte procurement

Table 1: Timeline of procurement

Date	Activity
26 July 2022	Deeds of confidentiality sent to potential suppliers
6 September 2022	RFQ sent to potential suppliers (selected from the Financial and Economic Analysis subpanel of the Whole of Government Management Advisor Services Panel)
16 September 2022	RFQ closing date
28 September 2022	Evaluation report finalised and endorsed by the Delegate
29 September 2022	First meeting with Deloitte
10 October 2022	Work order signed by Deloitte
11 October 2022	Work order signed by Treasury
24 November 2022	Contract posted on AusTender

Australian Government
The Treasury

Ministerial Submission

MS23-000540

FOR ACTION - Treasury's climate modelling forward plan

TO: Treasurer - The Hon Jim Chalmers MP

TIMING: By 6th April

RECOMMENDATION

- That you note the multi-staged approach to restore Treasury's role in modelling climate risks and opportunities over the next three years, ensuring alignment with planned major modelling exercises and the need to develop a modelling and analytical capability that is flexible, sustainable and credible.

Noted/Please discuss

- s 47C That you look to discuss Treasury's role (and its role more broadly) with your colleague, the Minister for Climate Change and Energy.

Noted / Please discuss

- That you note Treasury's capability uplift plan, which will develop an economic modelling framework that is flexible, sustainable and credible. This will provide support to the government's on-going commitment to climate change and managing the increasing complexity of climate change modelling.

Noted / Please discuss

Signature	Date: / /2023

KEY POINTS

The Net Zero transition task

- Decarbonisation of the globe will require one of the most significant structural changes since the industrial revolution, as world economies transition away from a heavy carbon reliance in an effort to keep global warming to a minimum.

- Australia has legislated more ambitious emissions reduction targets to support an orderly net zero transition. Reforming the Safeguard Mechanism and transformation of the electricity sector to 82 per cent renewables by 2030 are key policy pathways to help achieve this goal.

- Further development of existing and future policies will be needed in order for Australia to reach net zero by 2050. Australia's Net Zero Plan and Nationally Determined Contributions (currently in train) will be critical to this task.

- The global transition will have significant implications for Australia's economic outlook, as the world moves away from carbon heavy commodities and towards those which will support the renewable transition. Global policies such as the EU's Carbon Boarder Adjustment Mechanism will also have an impact on the Australian economy.

- Treasury has an important role to play in supporting government policy by providing advice on the most efficient policy pathways, the impact of policies (both domestic and global) on industries, regions and households, and in designing and implementing sustainable finance strategies.

- The climate transition will create structural economic change that is not straightforward to model. This landscape has changed significantly in the last decade, becoming more complex as a multitude of policies and behavioural responses by economic agents come into play.

    - Significant uncertainty around the timing and sequencing of actions to reduce greenhouse gas emissions also make it difficult to estimate the national and domestic implications for households, industries and regions.

    - There is uncertainty around climate impacts and the "best" policy tools that should be employed to mitigate impacts. To capture the full extent of uncertainty associated with climate transition, will require a certain level of consistency on scenarios that present different, plausible visions of climate risks and opportunities

- s 47C

Supporting government policy through a staged approach

- To support government decision making and re-establish Treasury's role as an authority on climate change, a staged approach will be employed over the next three years.

- Treasury is building an economic modelling framework that is flexible, sustainable and credible, to support the government's on-going commitment to climate change. The framework will be aligned with key analytical outputs, ensuring consistency, and credibility.

- The staged approach and intended outcomes are outlined below, and an illustrative timeline in **Attachment A**.

- **Stage 1: Build (2023)** will restore Treasury's role in climate modelling; s 21 establish enduring modelling capabilities with whole-of-government buy-in; and ensure consistency of climate modelling through co-ordination efforts.

- Modelling of reforms to the Safeguard Mechanism in collaboration with the Department of Climate Change, Energy, the Environment and Water and external providers has lifted Treasury's knowledge of carbon markets and expertise in abatement technologies.

  – Treasury can continue to draw on this expertise to play a role in providing advice on the continued evolution of the Safeguard Mechanism.

  – The knowledge gained will also be leveraged to support the provision of advice s s 47C

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Coordination of climate modelling

- There is a large volume of climate policy and modelling activity occurring across government **(see Attachment B).** Many of these processes are key priorities for government and will be subject to a high degree of scrutiny.

- Treasury has established a Cross-Government Climate Modelling and Policy Reference Group comprising senior officials from PM&C, Treasury, DCCEEW and DISR, and is working closely with other agencies, providing joint strategic direction of significant climate modelling activities and consistency (as far as feasible) in core assumptions being applied.

- Treasury is in the process of establishing a Climate Advisory Group with external experts in climate modelling, analysis and policy and has directly engaged leading academics in the field including Professor Frank Jotzo, Professor Tom Kompas and Professor Warwick McKibbin to provide expert advice.

- **Stage 2: Refine (2023-24)** will see Treasury helping the government to determine transition pathways; establishing Treasury as experts in climate and industry policy analysis through the consolidation and application of key analytical assets to major climate modelling exercises.

- There is an opportunity for Treasury to play a substantial role in providing global, whole-of-economy, sectoral and regional analysis to inform and influence major policy decisions.

- Australia's next Nationally Determined Contributions and Net Zero Plan will require significant economic modelling to support decision-making and inform policy pathways.

  - These exercises will be inextricably linked, as a decision on a 2035 target will inform what is possible and/or required during the transition to net zero by 2050. s 47C

s 47C

- Treasury will also play a role in advising on major structural shifts in the economy and policy adjustments. This will include the government's goal of reaching 82 per cent renewables in the electricity sector by 2030.

- **Stage 3: Mature (2025+)**: This stage will see Treasury further strengthen its reputation as a provider of expert advice on the economic effects of climate change and policy, and climate change effects and uncertainties will be more comprehensively embedded in Treasury's economic and fiscal frameworks.

  - By 2025, Treasury will have established a flexible, sustainable, and responsive framework for analysing and modelling the effects of climate change and policy. This framework will enable Treasury to provide robust advice on the effects of a range of physical impacts of climate change and policy pathways.

  - Treasury's economic and fiscal forecasting and projections frameworks will have been adapted and extended to incorporate the economic and fiscal effects of climate change. Frameworks are continuously reviewed to ensure they are fit for purpose and further incremental changes will be incorporated as required.

: s 47C [redacted]

: No major counterpart institution has incorporated a full net zero scenario into their long-term projections and economic baselines. Refer to **MS23-000179.**

Treasury's capability uplift

- The staged approach to restoring Treasury's role reflects the breadth and complexity of work that is required to develop the required modelling and analytical capability. **Attachment B** outlines in more detail Treasury's planned capability development.
  - A number of modelling tools, including global modelling using Warwick McKibbin's G-Cubed, input-output analysis and microdata analysis can be drawn on now.
  - Other models and frameworks will advance over time, with successive versions incorporating new features. This includes the Treasury Industry Model, which will be a key tool for domestic macroeconomic modelling.
  - Treasury's model development is being scheduled to match our understanding of the Government's planned policy timeline, ensuring the department can provide timely and fit-for-purpose advice.
  - Treasury's model development plans have been benchmarked to ensure they align with – and in some cases will exceed – those of international peers.

Clearance Officer
Angelia Grant
First Assistant Secretary
Macroeconomic Analysis and Policy Division
24th March 2023

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CONSULTATION

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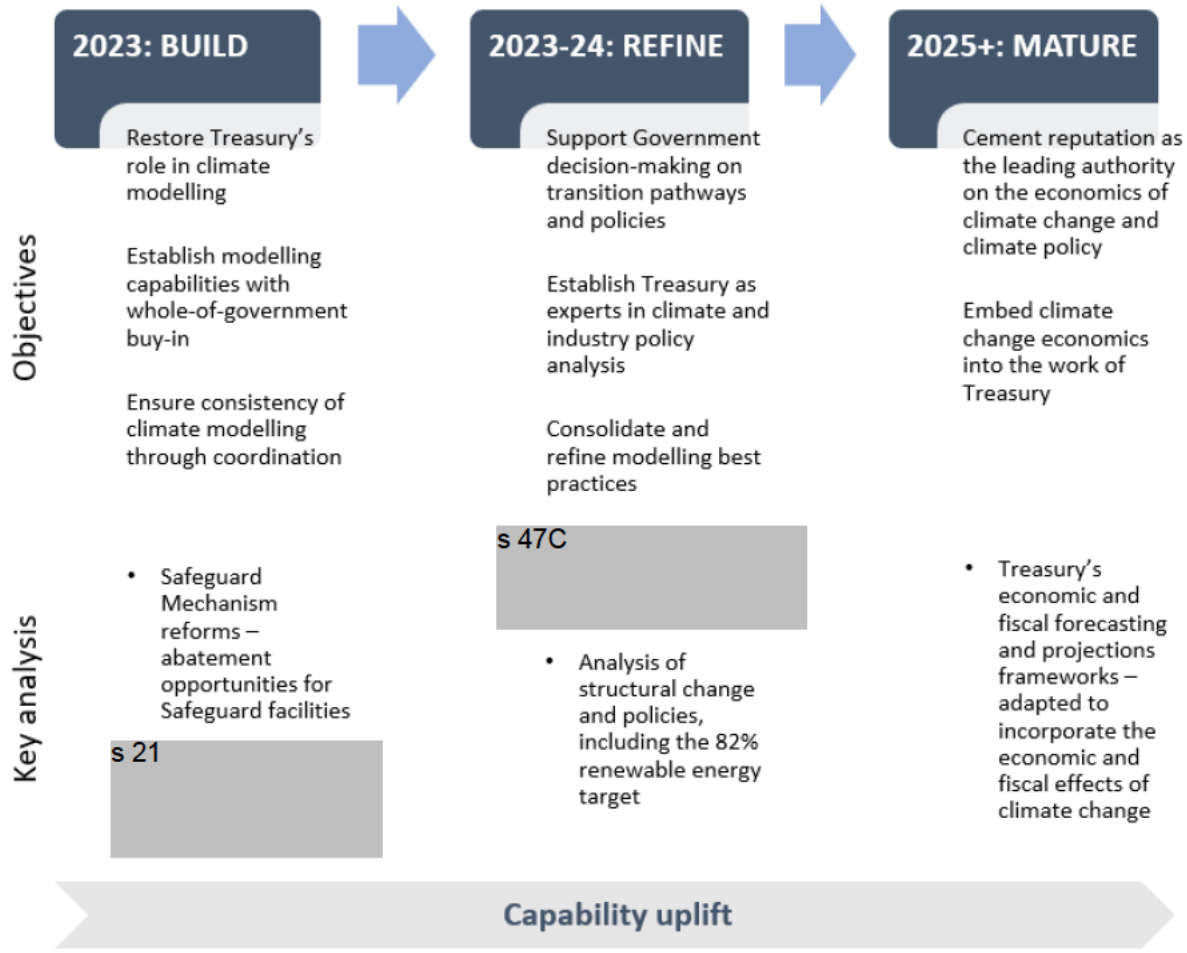
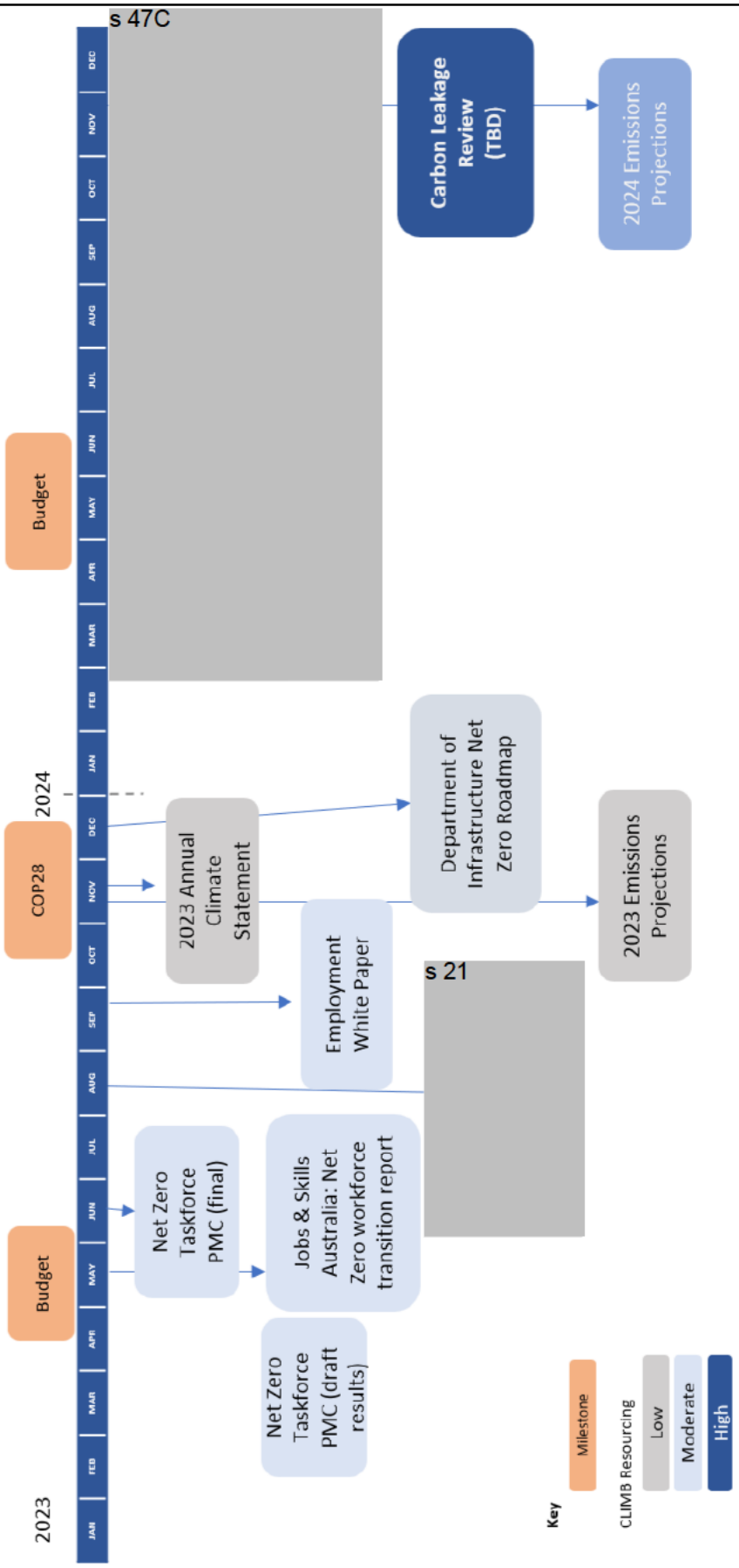
ATTACHMENTS

A: Climate modelling staged timeline
B: Key climate modelling exercises
C: Key modelling assets

ATTACHMENT A – CLIMATE MODELLING STAGED TIMELINE



ATTACHMENT B – KEY CLIMATE MODELLING EXERCISES



ATTACHMENT C – KEY MODELLING ASSETS

- In order to build required capability, Treasury, is developing a comprehensive suite of analytical tools, including models, data assets and infrastructure.
    - The suite of tools is designed provide a practical, fit-for-purpose and well-integrated framework that can be used to provide analysis across the broad range of issues that we expect to be engaging with, as well as analysis at global, national, sectoral and regional levels. Details of these assets are provided below.

Global Economic Models and Projections

- Global economic models will be used to assess the impact of global mitigation policies, and the global climate, trade and regulatory driven market shifts on the Australian economy. The analysis from the global models will also feed into domestic modelling exercises. The global economic modelling capability will be supported by a suite of general equilibrium models such as G-Cubed and Global Trade and Environment Model (GTEM).

- We have purchased Professor Warwick McKibbin's general equilibrium model G-Cubed, which has been extensively used in Australia and internationally to analyse the effects of climate change. We are engaging with Professor McKibbin to incorporate the latest emissions and energy data into G-Cubed and ensure it captures key behavioural responses critical for climate change analysis. G-Cubed is being set up to assess how major global structural changes and policy developments could spill over to the Australian economy.

- We are also exploring options to develop a framework for long term foreign demand analysis alongside DISR which will provide the capability for assessing changes in the demand for Australian exports due to shifts in the global demand and supply curves for bulk and critical mineral commodities.

Domestic Modelling Capabilities

- The Treasury Industry Model (TIM) will provide analysis of the domestic economy-wide effects of exogenous shifts in global transitions, domestic mitigation policy and the physical impacts from climate change. Importantly, TIM provides an internally-consistent framework to analyse the responses of households and firms to changes in the economic environment and policy. The model can also account for how changes to the global demand and supply of different commodities affects Australia.
    - As a general equilibrium model, TIM accounts for how outcomes in one market affect all other markets. This means the interactions between markets can be captured, which facilitates understanding how changes in specific sectors may impact the broader economy.
    - The model is well suited to analysing issues related to climate change and policy as it contains considerable detail on the production side of the Australian economy, including the 114 industries that are identified in the Australian Bureau of Statistics Input-Output tables.

- We are working on extensions to TIM to incorporate detail required for climate-related analysis, including emissions accounting, abatement opportunities across different sectors and a range of emissions-reductions policy instruments.

Sectoral Modelling

- Treasury will build sectoral-level capability to support the Government's emissions and clean energy targets in 2030 and beyond.
- Assets to support detailed analysis and advice on key sectors, including the costs and technological pathways they have to transition to net zero.
  - Sectoral models provide detailed analysis of the pathways to achieve net zero at a high level of technological detail. Conditional on cost input and supply assumptions, they provide insights into optimal timing and level of investment required to achieve certain emissions targets and, in some cases, policies.
  - Bottom-up modelling is a necessary complement to economy-wide general equilibrium modelling which ensures credible inputs and in turn outputs from TIM, such as the national electricity generation mix over time.
  - Currently, the key sectors of interest are electricity, industrials and transport. We are currently in the process of procuring and building interlinked techno-economic models focussing on these sectors.
    - : These models will be sufficiently flexible to model a range of implemented and potential policy changes that are relevant to each of the sectors, as well as emerging macroeconomic and sectoral conditions.
    - : The models are also intended to be sufficiently detailed so that we can analyse both micro-level effects for households and businesses as relevant.
  - We are investing in both data and research assets (such as Bloomberg New Energy Finance and detailed energy data) and relationships across government agencies and the private sectors to ensure we can provide support across a broad range of sectors.

Regional Analysis

- Regional datasets and analysis for regional level insights that support policy advice across regions impacted by the physical risk of climate change and the transition to reduce emissions.
  - Regional level climate change risk data informs the view of the future risk to people and businesses at the detailed geographic level, based on exposure of households and businesses to risk as well as the likely effects of the changing climate on local conditions.
  - Treasury will also develop tools and data to analyse the impacts of the transition to net zero emissions on regional communities from the perspective of regions that face challenges as well as opportunities to access new industries through the clean energy

transition. Treasury's analysis will build on the work of the Net Zero Taskforce to understand adaptive capacity in regions, as well as the Employment Whitepaper and the Jobs and Skills Australia analysis on the Clean Energy Workforce.

- Treasury is building a comprehensive regional level database that will be used in a range of socio-economic analyses to support policy advice and inform the impacts of future changes (including natural disasters) on regions.

Australian Government
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Ministerial Submission

MS23-000178

FOR ACTION – Publication of Treasury Technical Working Papers: Overlapping Generations Model of the Australian economy and the Treasury Industry Model

TO: Treasurer - The Hon Dr Jim Chalmers MP
CC:

TIMING

Routine. We plan to publish the technical working papers in February.

Recommendation

- That you agree to Treasury publishing the Overlapping Generations Model of the Australian economy and the Treasury Industry Model technical working papers.

Agreed / Not agreed

Signature	Date: / /2023

KEY POINTS

- These technical working papers (Attachments A and B) introduce the Overlapping Generations Model of the Australian economy (OLGA) and the Treasury Industry Model (TIM).
- Treasury maintains a suite of macroeconomic models for forecasting and counterfactual analysis. The governance of these models and the credibility of the analysis and briefing that they provide is enhanced by public dissemination and scrutiny through a variety of means, including publishing technical working papers.
  - Over the past decade, Treasury has published around 13 official working papers which detail analytical tools and methodologies ranging from single equation models to economy-wide frameworks.

  - Most recently, in the lead up to the 2021 Intergenerational Report, Treasury published technical working papers describing the Fiscal Impact of New Australians (FIONA) model and Treasury's Macro-econometric Model of Australia (EMMA).

- OLGA and TIM have been part of Treasury's suite of models since 2018 and 2019, respectively. Official technical working papers that provide important details for stakeholders have not yet been released.
  - OLGA is intended to be Treasury's primary economy-wide model for fiscal policy analysis. OLGA has significant detail relating to Australian households and is well-suited to analysing the aggregate and distributional (including intergenerational) effects of changes to the Australian income tax system.
  - TIM is intended to be Treasury's primary economy-wide model for analysing industry-specific policy/shocks. TIM has significant detail on the supply side of the economy and is well-suited to analysing questions related to international trade, technological change, and input costs (for example, fuel costs).
- We do not expect the publication of technical documentation to be controversial. OLGA and TIM have been in the public domain for several years.
  - The development of both models benefitted from widespread consultation with colleagues in the Australian Public Service, international policy agencies, academics and consulting community, including several presentations at academic conferences and invitation-only seminars.
- The technical working papers outline the purpose of OLGA and TIM and describe in detail their modelling framework and key assumptions.
  - The working papers cover the current working version of OLGA and TIM.
  - The working paper format follows the style used by academics in macroeconomics.

Clearance Officer	Contact Officer (OLGA)	Contact Officer (TIM)
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Principal Adviser	A/g EL2	EL1
Macroeconomic Group	Ph: s 22	Ph: s 22

ADDITIONAL INFORMATION AND SENSITIVITIES

- Within Macroeconomic Group, Treasury maintains a suite of complementary macroeconomic models for forecasting and counterfactual analysis:
  - The Treasury Macro-econometric Model of Australia (EMMA) is intended to fulfil and support the macroeconomic forecasting needs of Treasury.
  - Treasury's primary macroeconomic model for counterfactual fiscal policy analysis is the Overlapping Generations model of the Australian economy (OLGA).
  - Treasury's primary macroeconomic model for counterfactual industry-specific policy/shock analysis is the Treasury Industry Model (TIM).
  - This suite has been designed so that inherently more detailed analysis can be conducted using OLGA and TIM and subsequently fed into EMMA to produce changes to the Government's economic forecasts/projections and associated fiscal parameters.
- OLGA and TIM are dynamic general equilibrium models. They are consistent with current mainstream macroeconomic policy modelling employed by academic and policy agencies in the United States and Europe. Their theoretical foundations allow for a better understanding of the behavioural mechanisms at play within the Australian economy, with a strong focus on either the effect on households or industry.
- OLGA and TIM differ from economy-wide models used by other government agencies (for example, DISR, Productivity Commission and ABARES) and the Australian economic consulting sector by incorporating forward-looking behaviour and a well-defined, balanced growth path. (This contrasts with other models that rely on so called backward-looking behaviour, meaning they cannot anticipate future policy changes. This typically results in misleading estimates of policy effects (both size and timing) on household wealth, business investment and economic activity more broadly.)
  - Both are important inclusions for policy analysis as they provide vital insight into the likely effects of policy on household wealth and business investment decisions.
  - They are also crucial to generating a model-consistent measure of welfare or wellbeing that is useful for evaluating the benefits and costs of policy decisions.
- OLGA and TIM have been used to provide insights in support of policy decision-making since they became part of Treasury's suite of models in 2018 and 2019, respectively.
  - OLGA has been used to generate insights and estimates of the effects of a range of tax policy changes, including personal income and corporate tax changes. OLGA has also been used to provide estimates of the economy-wide effects of the economic contribution of migrants by visa class over their remaining lifetime.
  - TIM provided estimates of the likely effect on labour supply of increasing wages in the aged care sector, which fed in to the Commonwealth's 2022 submission to the Fair Work Commission Aged Care Work Value Case.

Potential sensitivities and limitations

- Given the extensive consultation process pursued during OLGA and TIM's development, and the fact the models have already been peer reviewed internally and externally, we do not expect the working papers to be controversial.
    - The development of OLGA and TIM benefited from wide consultation across and beyond the public service, including with the Reserve Bank of Australia, the Productivity Commission, the OECD, His Majesty's Treasury, UK Office for Budget Responsibility, the US Congressional Budget Office, the New Zealand Treasury, and academics from leading Australian universities.
    - OLGA and TIM have been presented at conferences, including the Global Trade Analysis Project Annual Conference, the Australian Conference of Economists, and Treasury-ANU Fiscal Policy Modelling Conference.
    - Treasury has also had the opportunity to present OLGA and TIM at seminars at academic institutions and universities, including the Victoria-University Centre of Policy Studies, University of Queensland, The Australian National University and The University of Adelaide.
- Extensions to OLGA and TIM will be undertaken in modules. As further policy analysis is required, modules will be developed to suit a particular need.

ATTACHMENTS

A: Overlapping Generations Model of the Australian economy Working Paper (titled Modelling Fiscal Policy with OLGA)

B: Treasury Industry Model Working Paper (titled Modelling Industry Specific Policy with TIM)

Senate Select Committee on Cost of living

ANSWERS TO QUESTIONS ON NOTICE

Treasury Portfolio

Inquiry into the Cost of Living

2022 - 2023

Division: Macroeconomic Analysis and Policy Division
Topic: IMF Modelling
Reference: Spoken (3 February 2023)
Senator: Matthew Canavan

Question:

Senator CANAVAN: The IMF reported this week that meeting the 43 per cent reduction in emissions, the government's policy, would require a carbon price equivalent to A$255 and cost households on average $4,500. Does Treasury agree with this modelling? Have they looked at it? You obviously don't seem to have done your own, but they have estimated it. Does that seem to be in the right ballpark—a $4,500 cost?
Mr Yeaman: I'm not familiar myself. I'm happy to take a look at that modelling and come back to you on that. The Department of Climate Change and Energy may have their own view.
Senator CANAVAN: No problems.

Answer:

Treasury is aware of recent IMF analysis and modelling of Australia's climate mitigation policies in their Selected Issues paper published on February 1st, which was referenced in the AFR on February 2nd (Jacob Greber in the AFR, "Emissions target 'equates to $4500 hit'").

- The $4,500 annual cost per household stated by the AFR is not referenced in either the recent IMF Country or the IMF Selected Issues report.
- It appears the AFR calculated $4,500 by multiplying annual carbon emissions per household (18 tonnes) and a carbon price of $255 (US$180) per tonne of CO_2.
- This scenario does not align with Government policy.