



# ANNUAL BUSINESS PLAN 2022

November 2021





## **ANNUAL BUSINESS PLAN 2022**

### **Prepared by**

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### **Version control**

FINAL

### **About PATREC**

The Planning and Transport Research Centre (PATREC) is a collaboration between the Government of Western Australia and local universities, constituted to conduct collaborative, applied research and teaching in support of policy in the connected spaces of transport and land use planning. The collaborating parties are: The University of Western Australia, Curtin University, Edith Cowan University, Department of Transport, Main Roads Western Australia, Western Australian Planning Commission and the Western Australian Local Government Association.

### **Publisher**

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## **1. INTRODUCTION**

### **1.1 About this Plan**

#### **1.1.1 Contractual requirement**

According to the Collaborative Agreement executed on 8 December 2016, annual business plans will be presented to the Board at the last meeting of each calendar year for approval and will direct business for the following year. They should include a description of the program of research to be undertaken by PATREC during that year, a budget for that year, planned targets for agreed financial and non-financial key performance indicators, and any update of the Strategic Plan for that year.

Annual business plans are prepared in the context of the prevailing strategic plan which is revised every three years. The current strategic plan is valid for the three-year period 2020-2022 and was approved by the Board on 12 December 2019. Any interim strategic updates are included as part of the annually prepared business plans.

#### **1.1.2 Purpose**

The purpose of this Business Plan 2022 is to:

- update the strategic drivers which could impact on PATREC's research plan for 2022;
- outline the research project program for 2022;
- provide a working budget for 2022;
- outline the human resources plan for 2022; and
- set key performance indicator targets.

### **1.2 About PATREC**

#### **1.2.1 Agreement**

PATREC was initially formed in 2002 but is most recently governed by the Collaborative Research Agreement signed in 2016 by six core partners:

- University of Western Australia
- Curtin University
- Edith Cowan University
- Department of Transport
- Main Roads Western Australia
- Western Australian Planning Commission.

The 2016 agreement includes a three-year rolling funding arrangement to provide a greater level of continuity.

The Western Australian Local Government Association (WALGA) joined the collaboration as a non-paying core partner in 2018.

#### **1.2.2 Purpose**

The PATREC mandate is to conduct collaborative, applied research and teaching in support of policy in the connected spaces of transport and land use planning.

#### **1.2.3 Governance**

PATREC is governed by a Board representing its sponsoring universities and the Government of Western Australia. The role of the Board is to provide leadership and strategic direction to the Centre

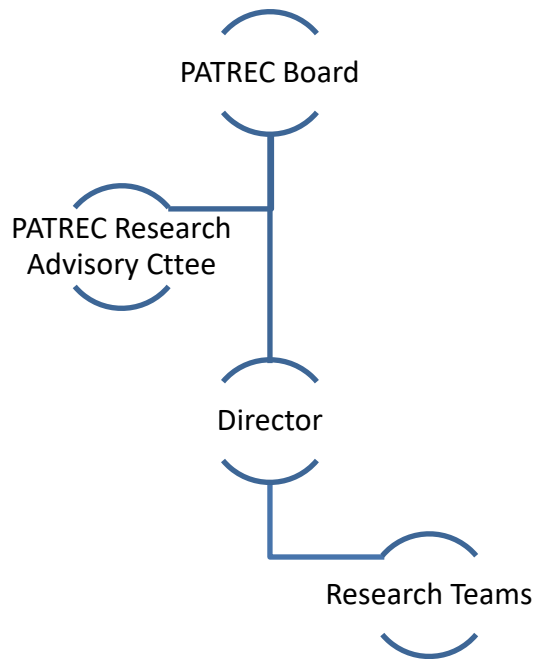
and to promote cooperation and collaboration between all parties involved. It has an independent chairman and meets three times per year. The following are the current Board members.

- Adj Prof Reece Waldock AM Independent Chairman
- Prof Nathaniel Belcher Curtin University
- Prof Kerry Brown Edith Cowan University
- Prof Andrew Page University of Western Australia
- Mr Steve Beyer Department of Transport
- Mr Peter Woronzow Director General Department of Transport
- Adj Prof David Caddy Western Australian Planning Commission
- Mr Ian Duncan WA Local Government Association

PATREC is led by its Director Professor Sharon Biermann and supported by two Research Fellows.

The PATREC Research Advisory Committee (PRAC) was established in 2016 and comprises senior representatives from each partner organisation, chaired by a nominated representative elected by the Board. The objectives of PRAC are to introduce an element of formality and rigour to the research project identification, selection, support, monitoring and dissemination process; enhance communication amongst partners; and advise the Board on project level matters, allowing the Board to focus on strategic matters.

The following diagram represents the hierarchal governance structure underpinning PATREC



**1.2.4 Relationships and Stakeholders**

Beyond the seven core partners the work of the Centre could not be completed without forging strong relationships within our academic, research and policy community but also amongst private industry with consulting and independent research agencies.

## 2. STRATEGIC DIRECTION

The most recent Strategic Plan, including a Business Plan for 2021, was approved by the Board on 12 December 2019 and sets out the direction of the Centre from 2020 to 2022. It is reviewed every three years with updates included in annual business plans.

### 2.1 Value Proposition

Capitalising on its extended [international] network of academic expertise and policy partners, PATRECs value proposition is to broker and conduct applied research and teaching in support of policy in the connected spaces of transport and land use planning through the following four key strategic activities:

1. multi-disciplinary, multi-institutional applied research in response to identified agency research requirements and knowledge gaps
2. knowledge transfer through academic and less formal publications, connection events and a website as a reliable and accessible resource for researchers and policy-makers
3. training, predominantly in the form of professional development through short courses, executive programs and “expert” courses on key topics, conducted in collaboration with other professional and industry bodies where possible
4. attracting additional research funds through business development.

in order to advance the knowledge base and forge new and innovative evidence-based solutions for effectively planning and managing Western Australia’s future.

### 2.2 Research Focus Areas

PATREC has established five research programs to undertake research and deliver high-impact outcomes, although collaboration between programs is expected and required. These programs were developed in response to the research needs and questions arising from the stakeholder-informed strategic planning process, the research competence base across the three collaborating universities and emerging external funding opportunities.

<b>Integrated land use and transport futures</b>
Improving land use and transport integration now and into the future, using a systems-based, scenario-oriented, big data analytics approach to longer term strategic forecasting and evaluation, depending on and informing, integrated LU-T modelling
<b>Smarter travel decisions</b>
Focus on the potential for deployment and integration of technology to enable more intelligent and connected transport choices, helping Australian cities use resources more efficiently and deferring the need for new infrastructure
<b>Integrated freight system optimisation</b>
Planning intermodal and general logistics infrastructure for the future needs of Perth
<b>Emerging technology and network optimisation and intelligence</b>
Developing a data- and simulation-driven decision support system for optimising road network operations
<b>Transport infrastructure investment risk management</b>
Incorporating uncertainty in transport infrastructure planning and policy through adapting portfolio-wide strategic infrastructure investment planning and management tools, guidelines and frameworks to account for emerging risks

## 2.3 Strategic Drivers Update

The strategic drivers presented in the Strategic Plan 2020-2022, remain relevant in relation to this Business Plan. Westport and Metronet remain the key government priorities affecting planning and transport in Western Australia, although the WA government's program, presented in *Our Priorities – Sharing prosperity*, has been "deferred indefinitely while the State Government focussed on its response to COVID-19". Since the last strategic update included in the Business Plan 2021, climate change and infrastructure priorities are emerging strongly as strategic drivers in WA with potential to begin to influence the strategic direction of PATREC.

- Infrastructure WA - Foundations for a Stronger Tomorrow, State Infrastructure Strategy, Draft for public comment, July 2021. Six main findings underpin many of the 88 recommendations in the Strategy across seven themes and nine sectors – of most relevant to PATREC are:
  - Greater focus on demand management and prevention initiatives is needed to ultimately divert, delay or avoid the need to build and maintain costly infrastructure
    - non-build and demand management options to reduce road congestion and grow public transport patronage
    - recognises the importance of digital technology on demand management – to improve understanding of consumer behaviour, better monitor infrastructure performance and provide valuable data to inform planning and decision-making – and therefore recommends applying a digital-first approach when considering infrastructure solutions
  - Improving the quality and consistency of strategic infrastructure planning and processes
    - preparing integrated regional plans to establish the long-term land use, infrastructure and environmental needs of each region of Western Australia
    - embedding rigorous infrastructure appraisal processes in the planning decision-making framework, including considering infrastructure servicing and operational costs
    - reviewing and refining the State Government's Strategic Asset Management Framework, and improving its application
  - Addressing climate change
    - developing net zero transition plans and sectoral emissions reductions strategies
    - developing climate change adaptation plans for existing infrastructure under the control of State agencies and GTEs
    - developing sectoral adaptation plans to identify climate change risks and measures to adapt to current and future climate change impacts
  - Implementing data sharing and other tools to support infrastructure planning and investment decision making
    - further developing government data management and asset information policies, processes, platforms and standards to enable data sharing and analysis to address both the management of the existing government asset portfolio, and to plan and prioritise new infrastructure
  - Optimising the existing infrastructure asset base
    - progressing targeted improvements to the road network and heavy rail infrastructure

- embedding a digital-first approach to all aspects of the infrastructure lifecycle and applying digital technologies or non-capital demand management solutions to extend asset life or increase capacity
    - improving the integration of land use and infrastructure planning to help improve the use of existing assets – for example, considering where system capacity is available to support increased urban densities
  - Identifying major infrastructure projects and programs
    - light rail/bus rapid transit
    - investigations for long-term major projects such as Stock Road river tunnel crossing, Bunbury Fast Rail, and Perth metropolitan orbital rail route
- Western Australian Climate Policy Nov 2020 – actions around a number of themes, most relevant to PATREC:
  - Lower-carbon transport
    - Outcomes:
      - Increased uptake of low- and zero-emissions vehicles, fuels and transport technologies
      - Lower greenhouse gas emissions and improved air quality
      - Improved public transport, freight transport and active transport options
    - Actions (most relevant):
      - **METRONET** - Continue to roll out Perth’s most ambitious public transport plan to create a framework for sustainable growth and reduced car dependency.
      - **Electric Vehicle Strategy** - Implement the State Electric Vehicle Strategy to accelerate uptake across Western Australia including:
        - fast charging infrastructure
        - State Government fleet targets
        - guidelines, standards and planning
        - industry development.
      - **Additional cycling infrastructure** - Invest in improved cycling infrastructure and connectivity including a pedestrian and cycling bridge across the Swan River.

Participation of PATREC in the iMOVE CRC (until 2027) and in the Australian Urban Research Infrastructure Network (AURIN) through the Australian Transport Research Cloud project (until December 2023) continue to provide a medium to longer term, national backbone to PATREC research.

### 3. LAST YEAR’S PERFORMANCE

Key achievements for 2021:

- New PATREC core research program (2021-2023) comprising 7 projects commenced in late 2021
- PATREC core research program (2019-2021)
  - Enhanced land use inputs to strategic transport models through advanced econometrics – completed
  - Modelling perimeter controls based on macroscopic fundamental diagrams – substantially completed
- External projects completed
  - Extension to Drones Video Analytics (Main Roads)



- Multi-Objective Genetic Algorithm Optimisation for Network Widening and Maintenance Scheduling (Main Roads)
- Roundabout modelling – pilot (Main Roads)
- External projects substantially progressed
  - iMOVE
    - Smart Transport Technology Roadmap Project (RAC, UWA)
    - Working from Home: Changes in Transport Demand (DOT, Main Roads, UWA, Curtin)
  - AURIN/Australian Research Data Commons
    - Australian Transport Research Cloud
  - ARC Linkage participation
    - Map My Say
- External projects negotiated and commencing
  - AI-assisted Model Calibration for Real-time Traffic Simulation (iMOVE, Main Roads, Aimsun, UWA) - commenced
  - Improved roundabout modelling using drone video analytics (iMOVE, Main Roads, Aimsun, UWA) – final stages of negotiation
- 10 peer-reviewed journal and conference papers published

#### 4. 2019-2021 CORE PROJECT COMPLETION

In 2022, one of the remaining two projects in the program will be completed but Enhanced Vehicle Detection will extend into 2023 due to issues in 2021 with sensor acquisition and installation by Main Roads. Key project activities for 2021 are outline in Table 1.

**Table 1: Activities for 2022 in completing 2019-2021 core program of projects**

Project	Activity
Enhanced Vehicle Detection at Traffic Signals and on Smart Freeways	Main Roads will play a major role in getting the project back on track – project management, governance and technology procurement, installation at trial sites. Data collection can then commence but no significant research will take place in 2022 as data needs to be collected over a range of conditions.
Modelling perimeter controls based on macroscopic fundamental diagrams	The final stage of the project will be completed with final report accepted in the first half of 2022.

## 5. 2021-2023 CORE PROJECT COMMENCEMENT

Most of the core projects as part of the agreed 21-23 research package, commenced in late 2021 (Table 2). The project duration is generally 18 months and so most of the substantive work will occur in 2022, although major outputs will only be delivered in mid-2023. \$714k of core funding was allocated to this program of research with additional funding provided by Main Roads for the Bridge Health Monitoring project bringing the total to \$804,931.

**Table 2: Core projects as part of the PATREC core project package (2021-2023)**

Project Title	Key Agency	Uni/s	Budget (\$)	Progress as at 17 Nov 2021
<i>Working from home travel impacts - DPLH component</i>	DPLH	Curtin/UWA	30,000	<i>Milestone 2 reports accepted</i>
Transport Environment and Kids... 15 Years On	DoT/DPLH	UWA	100,000	Agreement signed, kick-off meeting on 29 Nov 21
Identifying opportunities to address transport disadvantage	DoT (DoC)	PATREC, UWA, Curtin	99,594	Agreement reviewed and revised, with DoT for signing
Freight network to support NW freight task	DoT/DPLH	ECU	84,930	Agreement under revision and internal review before going to DoT then SC for review
Integrating AI and IoT based Bridge Health Monitoring	Main Roads	Curtin, UWA	270,407	Agreement signed, kick-off mtg held, 1st SC held, sub-contract with Curtin for review and signing, UWA staff appointed
Realtime model of delay at traffic signals (Value Driver)	Main Roads	PATREC/UWA	120,000	Agreement reviewed and revised, with MR for signing
ML models for road maintenance investment decision making	Main Roads	PATREC	100,000	Agreement reviewed and revised, with MR for signing
<b>TOTAL</b> (additional \$90,931 contributed by MRWA for Bridge Health)			804,931	
<b>PATREC available budget</b>			714,000	

While the 2021-2023 program of research will be in full progress during 2022, planning for the 2023-2025 program of research will need to commence in late 2022, following the process developed for the 2021-2023 round but implementing leanings which emerged to improve the process.

## 6. EXTERNAL PROJECTS 2022

PATREC will continue to pursue external project opportunities as they arise ie. those projects which do not receive any PATREC core funds. External projects can be funded by PATREC collaborating partners but contributing additional funds (to subscription payments) and/or by other external funding agencies including the Commonwealth.

There are already, however, a number of external projects signed-up and commencing which will absorb significant PATREC resources during 2022 (Table 3). More than half of these projects are iMOVE CRC external projects. As part of AURIN's collaborative ATRC, funded by the Australian Research Data Commons, PATREC is the lead for the WA Hub which will bring in secure funding over 3 years. The remaining external projects are those with PATREC partners, Main Roads WA and DoT.

**Table 3: External projects for 2022**

Project	Source/Status	Lead and participants	Funding/End date
<b>For completion in 2022</b>			
Smart Transport Technology Roadmap	PATREC-iMOVE-RACWA – in progress	Sae Chi (UWA, Curtin)	\$200k/Feb 22
Working from home – changes in transport demand (most PATREC partners involved)	PATREC-iMOVE – in progress	Sharon Biermann (UWA, Curtin)	\$240k/June 22
<b>Ongoing in 2022</b>			
AI-assisted Model Calibration for Real-time Traffic Simulation (Main Roads WA, Aimsun, UWA)	PATREC-iMOVE-Aimsun – agreement signed 17 Sept 2021	Chao Sun (UWA)	\$400k/Oct 23
Australian Transport Research Cloud – ADAPT accessibility tool	AURIN/ARDC – in progress	Sharon Biermann (UWA, Curtin)	\$450k/Dec 23
<b>Expected to commence in 2022</b>			
Improved roundabout modelling using drone video analytics	PATREC-iMOVE-Aimsun) – agreement in final stages of negotiation	Chao Sun (UWA)	\$392k/Dec 23
AURIN Transport Domain specialist support	Under negotiation	Sae Chi	\$100k/June 23
Innovation Connection (Metrocount)	Final stages of negotiation	Chao Sun	\$100k/Dec 22
<b>Possible commencement in 2022</b>			
AURIN high impact project	Application submitted	Sae Chi	\$150k/Dec 22
Perth Transport Model - with large consulting firm	Shortlisted, invited to submit proposal	Sharon Biermann (UWA)	Dec 24?
Freight vehicle priority trial	Main Roads costing the trial set-up before PATREC scopes the research	Tele Tan (Curtin)	\$120k/Dec 22
<b>Exploratory</b>			
Pursue opportunity of reviving a 2-year-old proposal for a WA Planning and Transport data hub	National Collaborative Research Infrastructure Strategy (NCRIS) and AURIN	Sharon Biermann (all PATREC parties)	
Pursue the opportunity of a project to support Westport planning enabled by possible availability of the expertise of an eminent academic, Prof. Martin Savelsberg	Westport-related	Sharon Biermann (all PATREC parties)	

## 7. BUDGET 2022

Increased subscription payments for 2022 as per the signed variation agreement have been included in the budget estimate (Table 4), together with expected income from external projects. The budget for 2022 as included in the prevailing three-year Strategic Plan 2020-2022 is included for comparison purposes. The main difference with the budget included in the Strategic Plan is as a result of “External” iMOVE project activity which attracts additional funding from partners and others (some of which flows through PATREC as in-out), together with additional Commonwealth funding from iMOVE. The other difference is that the iMOVE UWA funds are now used as required additional research contribution to External iMOVE projects which involves UWA researchers, while the increased subscription replaces the UWA funding as the requisite “university” contribution to iMOVE core projects (as per Board decision on 30 July 2020).

The estimated 2022 budget includes the forecast closing balance for 2021 of \$339,280 (as at 12 November 2021) for the purposes of this draft and will be updated with the actual year end (31 December 2021) closing balance in the final Business Plan 2022. This balance is higher than estimated on the Strategic Plan, primarily due to in-out additional contributions paid to PATREC in 2021 to be paid to iMOVE during 2022 and 2023 as additional external project contributions. In the order of \$200k will be paid to iMOVE in 2022, accounted for in “Researcher Assistants, Consultants, Expenses”.

**Table 4: Estimated Budget 2022**

<b>PATREC Income and Expenditure</b>	<b>Budget 2022 (Strat Plan)</b>	<b>Budget 2022</b>
<b>INCOME</b>		
WA Government Grants	290,170	290,170
Universities Sponsorship	209,337	209,337
iMOVE Commonwealth core	300,000	400,000
iMOVE UWA - for external projects	70,000	70,000
External	420,000	820,000
Accrued Interest	0	0
<b>Total Income</b>	<b>1,289,507</b>	<b>1,789,507</b>
<b>EXPENDITURE</b>		
<b>PATREC OFFICE</b>	<b>214,804</b>	<b>129,126</b>
Director (0.4)	96,069	96,391
Administrative support	76,000	0
General Office Costs incl. web services	15,000	5,000
Board Chair Stipend	27,735	27,735
<b>RESEARCH PROJECTS</b>	<b>1,097,877</b>	<b>1,786,095</b>
Research Co-ordination (Dir. 0.6)	144,104	144,587
iMOVE participation	220,000	220,000
PATREC Research Fellows	433,773	596,508
Researcher Assistants, Consultants, Expenses	300,000	825,000
<b>Total Expenditure</b>	<b>1,312,681</b>	<b>1,915,221</b>
<b>YTD BALANCE</b>	<b>-23,174</b>	<b>-125,714</b>
<b>Balance Brought Forward (as at 7 Jan 2022)</b>	<b>76,562</b>	<b>371,512</b>
<b>CLOSING BALANCE (incl Balance B/F)</b>	<b>53,389</b>	<b>245,798</b>

## 8. HUMAN RESOURCES

With leadership, administration and coordination by a small PATREC core team, a much wider team of PATREC project research associates from across the partner universities and with some support from adjuncts, consultants and PhD students, are called upon to conduct policy-informing, applied research. Through the mechanism of project steering committees, researchers are supported and enabled by a dedicated team of agency stakeholders who ensure that the research is well-aligned with policy objectives and that the research outcomes are well-communicated within the agencies and more widely as required.

The research team is broadly consistent with that presented in the Strategic Plan with extensions to expiring fixed-term and casual contracts taking place in late 2021 to ensure resourcing is secured to deliver on concluding and commencing core projects and external projects (Table 5). PATREC participants in the new round of PATREC projects (2021-2023) and external projects, have been included in the list (Table 5). Casual contract staff play a vital role in delivering on the research, usually in the role of research assistants, but have not been included in the list due to the short-term nature of their involvement.

**Table 5: Research Administration, Development, Coordination and Management**

PATREC Office		
Sharon Biermann	0.4 FTE	Director
Vacant	0.8 FTE	Centre Administrator – funding re-allocated to research
Research Team		
Sharon Biermann	0.6 FTE	Director – ongoing, contingent on funding
Yuchao Sun	1.0 FTE	PATREC Senior Research Fellow (traffic engineering); fixed-term (to Dec 2022)
Sae Chi	1.0 FTE	PATREC Research Fellow (transport economics); fixed-term (extended to Dec 2022)
Tristan Reed	0.8 FTE	PATREC Research Assistant, Curtin (to 18 November 2022)
New Academic A8	1.0 FTE	PATREC post-doc to support Chao Sun (2-year contract to Dec23) – recruitment in process
Sergio Matias	1.0 FTE	PATREC Research Assistant to Chao Sun (computer science); casual contract (extended to June 2022)
Rachel Cardell-Oliver		Research Associate, UWA Computer Science
Mark Reynolds		Research Associate, UWA Computer Science
Doina Olaru		Research Associate, UWA Business School
Kirsten Martinus		Research Associate, UWA Geography and Planning
Brett Smith		Research Associate, UWA Business School
Julie Lee		Research Associate, UWA Business School
Thomas Stemler		Research Associate, UWA Mathematics
Michael Small		Research Associate, UWA Mathematics and Statistics
Shannon Dee Algar		Research Associate, UWA Forrest Prospect Fellow, Maths and Statistics
Atif Mansoor		Research Associate, UWA Computer Science and Software Engineering
Farid Boussaid		Research Associate, UWA Electrical, Electronic & Computer Engineering
Mohammed Bennamoun		Research Associate, UWA Electrical, Electronic & Computer Engineering
Lynn Meuleners		Research Associate, WA Centre for Road Safety Research, UWA
Gina Trapp		Research Associate, Telethon Kids, UWA
Anna Gannett		Research Assistant and PhD candidate, Population and Global Health, UWA
Paula Hooper		Research Associate, AUDRC, UWA

Julie Saunders		Research Associate, Population and Global Health, UWA
Tele Tan		Research Associate, Electrical Engineering, Computing and Mathematical Sciences, Curtin
Jun Li		Research Associate, Civil and Mechanical Engineering, Curtin
Carey Curtis		Research Associate, Adjunct Prof UWA
Caroline Knight		Research Associate, CTWD, Curtin
Courtney Babb		Research Associate, Urban Planning, Curtin
Sharon Parker		Research Associate, Director, CTWD, Curtin
Cecilia Xia		Research Associate, Spatial Sciences, Curtin
David McMeekin		Research Associate, Electrical Engineering, Computing and Mathematical Sciences, Curtin
Kerry Brown		Research Associate, Employment and Industry, Business and Law ECU
Reza Kaini Mavi		Research Associate, Supply Chain and Project Management, Business and Law, ECU
Ferry Jie		Research Associate, Supply Chain and Logistics Management, Business and Law, ECU
Hadrian Djajadikerta		Research Associate, Strategic Management Accounting, Business and Law, ECU
Zhaoyong Zhang		Research Associate, Finance and Economics, Business and Law, ECU
Mohammad Iranmanesh		Research Associate, Vice-Chancellor's Research Fellow, Business and Law, ECU

## 9. KEY PERFORMANCE INDICATOR TARGETS 2022

Performance indicators include essential academic and policy impact indicators with focus on outputs and outcomes rather than inputs.

**Table 5: Key Performance Indicator Targets 2022**

<b>Performance Indicator</b>	<b>Target 2022</b>	<b>Note</b>
<b><i>Academic Performance Indicators</i></b>		
Number of journal papers published	8	
Number of peer-reviewed book chapters published	0	
Number of peer-reviewed conference papers published in proceedings	5	
Number of peer-reviewed books published	0	
Number of post graduate research students attracted (and graduated)	2	
Value (\$) of [direct] external research funding secured (through PATREC account)	\$1,290,000	As per budget
<b><i>Policy Impact Performance Indicators</i></b>		
Number of high impact, policy-informing projects/sub-projects completed	3	WFH, MFD, RAC
Number of substantive Technical Reports/Working Papers accepted/published	3	WFH, MFD, RAC
Number of PATREC Perspectives published on PATREC website	0	
Number of presentations at PATREC and other connection events	10	
Number of connection events arranged and held	3	
Number of short courses, unit contributions presented	3	
<b><i>Stakeholder satisfaction indicator</i></b>	85%	