Prime Minister Tony Abbott recently declared that he wanted to be known as the “infrastructure prime minister”. But what of Australia’s iciest infrastructure – that located in Antarctica?

A 20-year strategic plan for Australia’s Antarctic future was recently commissioned by the federal government, but it will be another six months before Tony Press, ex-director of the Australian Antarctic Division, reveals his “blueprint”.

So what is best practice when it comes to polar infrastructure, and where should Australia be heading to maintain our status as a leader in Antarctic science and operations?

**Stations**

The British Antarctic Survey completed construction of their new Halley VI Station on the floating Brunt Ice Shelf, atop the Weddell Sea, East Antarctica in 2012.

Because the Brunt Ice Shelf moves towards the sea at hundreds of metres per year, most of the old Halley stations now lie in the Southern Ocean. However, the award-winning new station, sitting on height-adjustable skis, can be towed inland every ten years or so, avoiding a watery grave.
Fortunately, Australia’s stations do not exist in such a dynamic environment. Although Halley VI was delivered appreciably over budget, along with Belgium’s zero-emission Princess Elisabeth Station (unmanned and remotely managed during the winter), it provides an example of the lightweight, modular, “minimal footprint” complexes that are now preferred by Antarctic operators.

This station further prompts the question: do we even need to man our stations over winter, caretaking at great expense of diesel fuel and dollars?

**Air and sea transport**

Australia lays claim to 42\% of Antarctica, a vast wedge of the southern continent stretching east from beneath South Africa to underneath New Zealand, dissected only by a thin wedge beneath Australia, the French claim.

Retaining strategically imperative access to this expanse means a double-barrelled intercontinental transport solution is necessary:

- a ship, for distributing heavy cargo to our solely coastal stations
- an air system, for rapid transfer of personnel and to locales far inland, away from the coast.

The South Africans (among others) have recently acquired a new icebreaker, and with Antarctic sea ice reaching record extents, Australia must choose wisely.

Australia’s icebreaker, the *Aurora Australis*, has served us well for more than 20 years, but repeated southern journeys take their toll. Icebreaker technology has since advanced and the vessel is nearing the end of its useful life.

A vessel must be commissioned that serves capably as both an ice-capable logistical vessel and a marine science platform. This vessel will provide the backbone of our logistical framework for some time.

Any air system would logically emanate from Hobart, Australia’s Antarctic “hub”. It should provide rapid access to one or all of our stations.

But we have learned from our experience with the Wilkins Runway near Casey Station melting last year: any intercontinental air link should exist immediately next to a station and...
must be open throughout the summer operational season.

A runway-surface/landing-gear configuration should be selected allowing ready use of Antarctica’s most plentiful construction material – snow – rather than relying on isolated patches of suitable ice.

A suitable intracontinental system should also be chosen to provide efficient deep field access, ranging between stations and preferably interagency compatibility. Spare parts can be hard to come by down south.

**Overland transport**

The United States Antarctic Program recently revolutionised heavy ground transport by using “winterised” standard agricultural tractors running on rubber tracks.

In all but the harshest conditions, rubber tracks are much better than metal-tracked vehicles (although I did specifically select metal tracks for Sir Ranulph Fiennes’ aborted Coldest Journey winter crossing of Antarctica in 2013 because of the extreme conditions).

Fuel is now typically stored in flexible rubber bladders (or “flubbers”) that along with containers or cabooses, can now be towed on low-friction polycarbonate sleds.

This system is fast and efficient and allows transportation of large quantities of fuel (still the lifeblood of current Antarctic stations) from coastal McMurdo Base to the US station at South Pole.

Overland efficiencies approach nine times better than that attained with air transport. Many nations have now adopted this protocol and it is where Australia should head.

Concurrent with any heavy-traverse capability, Australia should be thinking on how best to physically traverse our extensive inland reaches. Snowmobiles have typically been the vehicle of choice for personal snow transport, but they are inefficient and rely on petrol.

An air-transportable, diesel-fuelled fleet would be more efficient and reduce logistical complexity. The British-led Moon-Regan Expedition recently completed a return journey across Antarctica (some 4,000 km) using a lightweight ski-equipped “scout” vehicle in just over 20 days.
Perhaps variations on this concept using a poly base, Arctic Trucks or variations on the new Australian Tomcar should be considered as efficient long-range polar patrol vehicles.

So who does what?

Traditionally, Antarctica has been the preserve of governments with vast budgets, bludgeoning the wilderness into submission, much like the early Himalayan “siege” expeditions.

But now, budgets are shrinking, environmentalism is (thankfully) key, and increasingly, private companies such as Antarctic Logistics and Expeditions and Antarctic Logistics Centre International offer logistical services both to and within Antarctica.

All Antarctic national states should consider exactly what they need to “own” and how can increased sharing of infrastructural and logistical assets with government and private peers allow increased scientific productivity on reduced government budgets.

Dr Press has a lot to consider. I look forward to his report.