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Dear Chairman

*In reference to the **Impact of the Murray-Darling Basin Plan in Regional Australia inquiry I can only say what a "who ha" over nothing. No amount of expenditure will fix the problem, if a problem really exists. There has been more rain over the Murray-darling Basin in the past two months than all of the water taken under licence over the past 30 years.***

some 15 years ago there was a report named, "The Bradfield Scheme" and this proposed that both water and gas (from the NW Shelf) be piped Southwards from the Ord and Daly rivers. I have attached that report for reading and inclusion.

At the time the Bradfield Scheme was costed at \$9.6billion Dollars which of course today would be in the vicinity of \$15-18 Billion. However the benefits of an expenditure in this amount would be recouped from farming and irrigation many time over the next ten years.

The funding of \$12 Billion to the Murray-Darling Basin could be diverted to a scheme that would provide a greater benefit to Australia than ripping the heart out of the producers in the Murray-Darling Basin.

In addition to the Bradfield Schemes are the schemes to harness water from the Burdekin and Clarence Rivers for the use of Dams, Hydro Electricity and farming.

In addition to all of the above there are many Northern Rivers that have above average rainfall in the North of Australia and each of these could be harnessed as well.

So why not be a Visionary and set up the greatest Infrastructure Project in Australia for the future.

Regards

John Pritchard
RAE (retd)

SIMULTANEOUSLY DROUGHT PROOFING AND MEETING 2020 EMISSION TARGETS

EXECUTIVE SUMMARY:

The monsoonal rains fall in the Far North and are wasted plus the country's major LNG field is located at the North West Shelf .In the southern half of the continent water is in drastically short supply for a number of reasons plus the most of the country's electricity generation occurs using brown and black coal.

It is proposed that gas and water pipelines are laid concurrently from the far north to the south east of the continent. The gas pipeline would join the North West Shelf to the pipeline network that radiates from Moomba to Brisbane, Sydney, Melbourne and Adelaide. This gas would be used to replace the black and brown coal burning electricity power stations. The water pipeline would be laid from the Ord River and Daly River to the upper reaches of the Darling River. This water would not only save existing agricultural and pastoral industries in the Murray Darling Basin it would allow them to expand the food producing capacity. It would also alleviate the need for environmentally destructive desalination plants and Artesian Basin extraction to service cities, towns and mining ventures both existing and future.

There is an enormous amount of water lost from open channels through evaporation and ground seepage. This can be dramatically reduced using local regional labour and equipment laying an Australian manufactured pipe. For an expenditure of a mere \$140 million the GDP can be increased by \$1.4 Billion pa.

The cost of the construction and operation of the pipelines could be borne by a BOO or BOOT scheme or a Government Bond Issue and whatever would be charged to the users.

1.The Problems:

In essence,75% of the National water resources lie above the 26th parallel and the food production and population are in the south where droughts are occurring with increasing severity and frequency and what rainfall runoff does get into the Murray Darling system has been distributed unscientifically and unfairly.

Similarly the main source of LNG is the North West Shelf and the main electricity generation is in the south using brown and black coal. LNG fired power stations are dramatically less polluting .

The following are some of the problems and the solutions,

1.1.Riparian Rights

The states and farmers at the top of the river catchments adopt the attitude "Possession is nine tenths of the law". They have, in fact, been issued with licences that over allocate the water so that in droughts very little water gets to the mouth of the system.

The same attitude is adopted by the farmers and states where the monsoonal rains are in excess to local needs. They would prefer to waste the water rather than share it with the drought ravaged south of the continent where the food production and population are concentrated mainly in the South East and South West.

1.2. Wasteful Irrigation Practices.

In the upper reaches of the Darling catchment wasteful practices are employed (eg flood irrigation, open channels and sprinklers which are susceptible to evaporation and ground seepage) whereas in the lower reaches, where the water is in short supply, farmers are “forced” to adopt more conservative practices like drip irrigation.

Irrigators in the Ord River Irrigation Area also have such a surplus of water that they too flood irrigate.etc.

1.3. Overallocation of Water Licences

Upstream states “understandably” over allocated water licences in order that as little as possible of the water that falls in the state goes across the border. The Farmers take that strategy one step further. They retain the rainfall runoff on their properties so it does not even get into the watercourses. In that way they do not have to draw on their licences and so they can afford to sell their licences to the Federal Government’s Buy Back Scheme .

1.4. Buy Back of Licences and Properties

The buy back of licences and properties in the Murray Darling System is a waste of money . The result is little or no more water in the system and so there is decreasing food production in the area that is regarded as the Food Basket of Australia. Permanent plantings are being pulled and annual plantings are not being sown. Global Warming will mean that buy backs and acquisitions will have to continue so food production will continue to decrease and food prices rise.. The end result will be Australia having to import more and more of its food supplies.

1.5. Barrages

The barrages along the Murray and Darling Rivers were first conceived when there was paddle steamer traffic but were constructed in the 1930’s when rail had replaced paddle steamers. The principal reason for installing them was to retain water for irrigation and town water supplies albeit locks were installed in each barrage to accommodate river traffic.

Barrages were installed at the bottom of Lake Alexandrina to give fresh water to the abutting land holdings which previously fronted salt water lakes and only got fresh water when the River System was in flood.. This was a mistake in that it exposed an enormous surface area of fresh water to evaporation. The repercussions were not realised at the time and it took a combination of drought and over allocation of water licences to make the folly obvious.

Considerable infrastructure and plantings have been developed by industry and towns that are dependent on fresh water from the Murray Darling system. This includes the properties that abut the lower lakes.

1.6. Silting of the Murray Mouth

Before the barrages were installed, isolating the Lower Lakes from the Coorong, the Murray Mouth was kept open simply by the volume of salt water moving back and forth through the mouth at the changes of tides. The Barrages meant that the salt water movement was confined to only the Coorong and so the movements were not sufficient to even keep a small passage open. Continuous dredging of the mouth is required to facilitate at least some exchange with the ocean. This dredging costs \$5 million pa.

The only time there is sufficient flow through the mouth to keep it open is when the river system floods. That is an infrequent event and is a one way flow of fresh water into the ocean and so there is no salt water exchange into the Coorong.

1.7. Acid Sulphate Soils (ASS)

The receding waters of the lower lakes have exposed areas that become contaminated with a weak sulphurous acid. The acid in these areas has to be either bio remediated (neutralised using biological means like compost etc) or chemically neutralised (ie the addition of lime).or both .Then the areas can be covered again by water. It does not matter if that water is salt or fresh.

1.8. Planned “Solutions” to Lower Lakes

The barrages at the bottom of Lake Alexandrina were put there to stop the salt water entering the lakes and to provide fresh water to abutting landholdings which now have established industries dependant on that fresh water. That location of the barrages was a mistake because to provide that fresh water the water spreads out from a 200 m wide river at Wellington to Lake Alexandrina 40 km x 20 km and Lake Albert 20 km x 10 km. There is an enormous loss of fresh water due to evaporation that cannot be allowed to continue even after water flows in the river system.

The Goolwa Channel is planned to be isolated by a temporary barrier so it can be isolated from Lake Alexandrina and remain fresh whilst salt water is released back into the Lakes. This barrier plus the temporary weir at Wellington (1.9 below) are termed “temporary” because it is planned to remove them when the rivers flow again. This is a bandaid solution that will have to be applied again when the next drought hits..The solution is to immunise Australia against drought not continuously having to address the affects of drought.

The sudden intrusion of salt water will kill off fresh water fish and plants (reeds etc)

1.9. Desalination Plants

Adelaide and many of South Australia’s major cities get their water supplies from a pipe network that originates at Mannum. If the Lower Lakes are opened to the ocean (ie the barrages opened) the current flow of fresh water down the Murray River will eventually be insufficient to stop the salt water from extending up to Mannum and contaminating Adelaide’s water supply.

Desalination plants are being proposed and constructed to provide cities with their fresh water . Such plants are inordinately expensive for the volume of water they supply, consume enormous amounts of electricity and have a brine waste that is difficult to be adsorbed by the ocean.

1.10. Water Wastage in Far North

Monsoonal rainfall occurs in a narrow belt across the far north of Australia where 22 to 24% of the rainfall runs off into the ocean .The Ord River Scheme was meant to produce water for extensive farming enterprises. The climate and soil have meant that there is limited food production and what production there is limited to “exotic” crops. The crops that are affected by the drought in the south do not grow in the tropics. Farmers in the Ord River are blessed with more water than they can use so do not conserve water..

The Ord River Dam produces hydro electricity for the Argyle Diamond Mine and Kununurra. There is no use for the off peak power and the water flows through the plant 24 / 7 whether it is producing power or not so that in itself is a waste of water. The hydro electricity flow exceeds that need for environmental flow in the river.

1.11. Pipe the Water from the Far North to the South

Only a fraction of the rainfall runoff that is wasted in the far north needs to be captured and piped to the upper reaches of the Darling River. This would mean there would be no need to buy back water licences and properties in the Murray Darling System and would, in fact, mean the present infrastructure would be able to be expanded and production increased. Melbourne would be able to take water from the Goulbourn River because the extra flow in the Darling River would more than satisfy the needs downstream of the Murray Darling junction.

Detractors of such schemes suggest that the cost of getting power to the pumping stations would be prohibitive. This is not the case as there is more than enough hot rock and solar energy along any possible pipe's route to power the pumps required at intervals to keep the water flowing through the pipe. If an LNG pipeline were laid along with the water pipeline then LNG from the North West Shelf could fire power stations at various locations along the alignment of the pipelines.

1.12. Mining Developments

There are at least 28 future mining developments going ahead in the near future in the north of South Australia. They will require water for towns as well as mine operations. Current thinking is that this will be obtained from the Great Artesian Basin and / or a desalination plant at the head of the Gulf. Both methods have environmental costs whereas branch lines off the proposed pipeline would have negligible environmental impact.

1.13. Coal Powered Electricity Power Stations

The two biggest contributors to global warming in Australia are power generation and transport. Australia has an abundance of black and brown coal and so it has been the cheapest means of fuelling power generation but it is also the most polluting. Even "clean Coal generation" is a misnomer as it simply means burning with less carbon dioxide emission than from conventional station. It still produces more greenhouse gases than LNG.

Combustion engines can be fuelled by LNG but Car Manufacturers persist in producing petrol/diesel engines. However, the car producers have been "forced" to develop green cars and LNG would be one of the possible clean fuels.

1.14. Exporting LNG

Because of its proximity to enormous LNG markets in Asia it has been "natural" to ship LNG to those markets. This requires the construction of a port that will mean a section of the pristine Kimberly Coast will be sacrificed in the "pursuit of the almighty dollar".

The LNG reserves on the North West Shelf are finite and when they run out the possibility is that Australia will have to import from elsewhere to generate its electricity.

1.15. 2020 Greenhouse Gas Target

Australia has committed to Greenhouse gas targets that will put such impost on certain sectors of industry that their cost of production will increase to the extent that they will become uncompetitive.. Reducing the emissions from electricity generation will relieve the pressure on these sections of industry as their proportion of the target will be reduced by the power generation being fuelled by LNG rather than coal...

2. Solutions

"Water is the key to Australia's future. To be Clever is to have the courage to unlock it---the big rivers of Australia must be harvested" (Ernie Bridge 1/12/94)Ernie Bridge came up with the

concept of a National Water Distribution Scheme that harvested the water from the Far North and piped it to where the farming, population and mining ventures are concentrated in the South East and the South West of the continent that are susceptible to droughts of ever increasing severity and frequency.. That scheme was pertinent 14 years ago and is even more so now that the inevitability of Global Warming is recognised. An integral and top priority part of that scheme was a pipeline from the Ord River and the Daly Rivers to the Darling River(in excess of 3,500 GL is available).

Current actions by Governments are simply placing band-aids on the affects of drought instead of immunising the country against drought. The long term vision that produced the Snowy River Scheme is required urgently. The suggested pipeline is nowhere near the engineering feat of the Snowy and can be completed in a relatively short time (eg 18 months) because the project can be divided into a number of sections that can be constructed concurrently.

This is an ideal project for “financial stimulus” as it provides regional employment and materials supply during construction and it increases the productivity of infrastructure that is already in place (including permanent plantings) that is simply crying out for more water so it can be expanded and employ the people who have been laid off by the “recession we had to have”..

A gas pipeline could be laid along with the water pipeline to connect the North West Shelf with the network that radiates out from Moomba to Brisbane, Sydney, Melbourne and Adelaide. The LNG could be used in place of coal to fire the electricity power stations in those centres. Similarly branch pipelines along the alignment could fuel power stations to provide electricity to existing remote towns and cities but also those that will arise on the mining leases. That power could be used to drive some of the pumps along the pipeline.

The following are solutions to the problems identified above:

2.1. Pipelines

Ernie Bridge’s “National Water Distribution Scheme” needs to be adopted and stage 1 the Ord to Darling Pipeline constructed in as short a time as possible. The LNG pipeline would be laid at the same time. There are some minor engineering design and administrative factors that need to be addressed:

- **Balance Inflows, Storage and Outflows**

Meteorologists and hydrologists can determine when the best and worst runoffs from the monsoons may occur, the best and worst rainfalls in the Murray Darling Catchment may occur and what environmental flows are required in the Daly and Ord Rivers. From this information they can determine the storage required to supply local irrigation requirements at the Ord River and Daly River and how much water can be released year by year into the Darling River.. The resultant totals would enable the water to be licensed scientifically by one Federal Body.

- **Hydro Electricity Plant.**

The water that passes through the plant at the Ord River Dam needs to be intercepted by a down stream coffer dam and all but environmental flow be pumped during off peak into the pipeline

- **Solar Powered Pumps**

There is a need for pumps along the pipeline to overcome head loss mainly due to friction. Such pumping stations could be powered by solar panels . These Pumping stations would need to be secure..

- **Back Flow Reservoirs**

Down stream pumping stations on the pipeline may not be able to keep up with the volume being pumped through from up stream (eg the down stream pump could be powered by a solar panel and it is experiencing cloudy weather).. There would need to be periodic reservoirs where the backlog of water can be held until “equilibrium” is regained.

- Quarantine Water

It will be necessary for the water to be treated in some way at source so that no vectors , seeds etc are carried from the far north into the Darling.

- Discharge structure

The point at which the pipeline discharges into the Darling needs to be capable of carrying the volume of flow

- Water Licences

The water allocation to irrigators , towns mines etc is to be done on a scientific and equitable basis and at a charge that will recoup the cost of construction, operation and maintenance of the pipeline..

- Desalination Plants

There would not be a need for desalination plants so interim supplies of water would have to be found for Adelaide until the water starts to flow down the pipeline.

- “Eco Bonds”

The Government could fund the project using an issue of Government Bonds. Such bonds would be attractive for people and investment companies who have been “burnt” by the Global Financial Crisis and are looking for a secure investment in the future.

- Privatisation

The pipe line could be constructed and operated by private industry. on a Build Own Operate (BOO) or Build Own Operate and Transfer (BOOT) scheme

- Staged Construction.

Lake Argyle (Ord River Scheme would be connected initially to get water flowing into the Darling . The Daly River would have to be dammed and connected later.

- Gas Pipeline

A gas pipeline could be laid at the same time that would join the North West Shelf gas field to the Moomba field that is joined to Brisbane, Sydney, Melbourne and Adelaide. This would help with the cost of construction, provide gas to towns along the route and provide fuel to power stations that could provide electricity to those towns as well as the pumping stations..

- Pipe Open Channels

There are 7000km of open channels (excluding on farm systems) which can be replaced by pipes that have been developed by Pratt Waters (Richard Pratt). The total cost such a replacement would be \$140 million and save 23% of the water that currently evaporates and leaches away into the ground.. This water saving would add \$1.4 billion pa to the GDP.

2.2.Lower Lakes

The existing situation at the lakes cannot be allowed to continue even when water starts flowing again. It was a mistake to put the barrages at the bottom of Lake Alexandrina. Fresh water cannot be allowed to spread out over the lake to evaporate as it has in the past. That fresh water needs to be replaced by salt water. However industries and townships have grown up around the lakes that are dependent on the lakes being fresh. Therefore a compromise is required where the properties abutting the Lower Lakes continue to have access to fresh water and the majority of the lake is filled with salt water from the ocean which can be subjected to the evaporation.. This can be achieved by excavating / dredging channels each side of Lake Alexandrina joining the Murray at Wellington to the Barrages at Goolwa and Pelican Point . These barrages would remain closed (but still supplying environment flows of fresh water to the Coorong) and the remaining barrages opened to the ocean.. There would be some minor engineering and administrative matters to be addressed:

- Bund / Dyke between Channel and Lake

The channels would be 200 m wide and the excavated / dredged material would be used to create a bund that would be 200m wide and stabilised using plantings and / or mechanical structures to avoid erosion when flood waters would exceed the capacity of the channels and flow over the bund into the salt water lake.

- Construction Time

The channels could be divided into sections that could be constructed concurrently in less than 12 months. The Channel from Wellington to the Goolwa Channel could be constructed first and be completed within 4 months avoiding the cost of the temporary barrier.

- Lake Albert

A structure would need to be constructed at Lake Albert to place fresh water into a perimeter channel and salt water into the centre of the lake. An alternative could be to continue the pumping of fresh water into the lake as required.

- Murray Mouth

The dredging of the mouth would become unnecessary so that effort could be diverted to the maintenance of the channels and bunds

- Access to the Salt Water Lake Alexandrina

Access to the Lake would still be available through the Goolwa Barrages but there would need to have simple locks through the bund at various points especially on the east side of the lake.

- Remediation of ASS

The neutralisation of the ASS needs to be carried out immediately. Any time it is encountered during the dredging of the channel lime can be added directly to the sludge before it is discharged onto the bund;

- Rip Wrap Walling

Where the bund is being laid using dredging there will be a need to lay rock cages to contain the dredged material and release the water during construction

- Controlled Entry of Salt Water

A controlled and slow release of the salt water through the barrages whilst the channels are constructed will halt the spread of the ASS and enable the fish to retreat up river and the reeds etc along the shoreline will be able to recover when fresh water is reintroduced in the channels

- “Permanent” Temporary Wellington Weir

The purpose of the temporary weir would be to stop the salt water from going up the river during the construction of the bunds. The bund on the Western side of Lake Alexandrina to the eastern end of Hindmarsh Island (ie to Goolwa Channel) could be constructed first and the bund on the eastern side could be done at a later date if ever. Therefore the weir could be constructed in three sections. One central section would be permanent and able to split the flow and divert any flood waters into the channels each side of the Lake. The two sections each side would be temporary and removed once the channels are completed.

LONG TERM SOLUTION TO THE LOWER LAKES

EXECUTIVE SUMMARY:

The solution to the Lower Lakes does not have to be temporary but part of a staged final solution.. Eventually water will come down the Murray for any number of reasons (viz breaking of the drought, equitable allocation of irrigation licences and / or piping of water from the Kimberlys). Before that occurs, actions have to be taken to ensure the fresh water that does reach Wellington is not again wasted to evaporation on the enormous surface area of the Lower Lakes. The fresh water that reaches Wellington should continue onto the Coorong in a watercourse no wider nor shallower than the river at Wellington. Understandably this wastage due to evaporation has been a sticking point in negotiations with all upstream irrigators and state to release water to “save the Lower Lakes” that 70 years ago were salt.

The first stage of the solution is to concurrently construct a weir and allow a controlled release of salt water through the barrages. The weir is to prevent the salt water getting up the river to contaminate the Adelaide water supply whilst stage two is constructed. The controlled release of salt water is to stop further exposure of ASS and to allow fresh water fish to retreat up the river ahead of the salt water.

Stage two is the construction of a channel and bund to connect up with the Goolwa Channel alleviating the need for a temporary barrier at Clayton..

Stage three is filling of the lakes with salt water and the third stage is optional but would be the construction of a channel on the east side of the lakes from Wellington to Pelican Point.

The volume of salt water that would come through the mouth at the changes in tide would be increased dramatically so there would be no need to dredge to keep the mouth open.

RATIONALE

It would be ideal if any action taken in the Lower Lakes could meet the following requirements:

Continued Fresh Water Frontages

The construction of the barrages has meant that farming has developed dependent on there being fresh water in the lakes. These farms and communities should not lose this access to fresh water frontage.

Minimize Fresh Water Evaporation Loss

The vast area of lakes means that there is an inordinate amount of fresh water is wasted to evaporation. The means to deliver fresh water to farms should have limited surface area and accordingly deeper .

Fresh Water Discharge into the Coorong

There needs to be an environmental release of fresh water into the southern end of the Coorong to maintain fish nurseries.

Maintain Navigable Connection between the Coorong and Murray River
Boats from the Murray River have always been able to gain access to the Coorong via the loch at the Goolwa Barrage.

Minimum Impact to Fresh Water Reeds and Fishery

The vegetation that has developed over 70 years is dependent on fresh water so sudden salt water intrusion will upset that. Similarly fish will not have time to migrate up stream if there is a sudden inflow of salt water

Acid Sulphate Sludge

The lower lakes have been maintained wet for the last 70 years since the barrages were constructed so that situation needs to continue either with fresh or salt water. Where ASS are already exposed there needs to be bio remediation and lime treatment so that there are no problems when water returns .be that water fresh or salt.

Keep the Mouth Open

It is necessary to have the mouth open so the Coorong is flushed by tidal movements. The greater the volume involved in the tidal movement the wider is the mouth that is kept open naturally and so there is no need to dredge it clear.

Maintain Water Levels for Recreation

There are businesses and private boat owners who rely on there being navigable water in the lake especially at Goolwa and Clayton. These are used to fresh water but can be accommodated by salt water.

Compatible with Future Actions on the Murray Darling System

There will presumably more water that will come down the Murray River so there will obviously be conditions imposed like restricting the evaporation.

Protection of Adelaide Water Supply from Contamination

It will be necessary to prevent salt water getting up as far as the pumping station. That will require a weir at Wellington. That weir needs to be in three sections. One central section would be permanent and capable of withstanding flood waters . This section would divert the river flows into the channel(s). The section to the west would definitely be temporary and would be removed when the channel was completed to the Goolwa Channel. The eastern end of the weir would be temporary so as not to preclude the possibility of a channel on the eastern side of the lakes.

The solutions should address as much as possible of each of the above. In that way most if not all of peoples concerns are addressed:

The objective has to be to restrict the surface area of the fresh water exposed to evaporation whilst maintaining fresh water frontages as is the situation now. Channels can be dug from the Murray just below Wellington each side of Lake Alexandrina using the spoil to create a bund / dyke some 200 m off shore. The Channels end at the

Pelican Point Barrage and the Goolwa Barrage . These two barrages are kept closed and the remaining opened to allow full tidal movement into the Lake.

The bund would be constructed between rip wrap rock filled cages to capture the dredged soil and allow the release of the water from the dredged slurry. The bunds would be up to 200 wide and planted with vegetation that would be stable enough for flood waters to flow over it into the salt water lake

The construction time for the channels depends on how many sections to channels can be constructed concurrently. It would be reasonable to construct the channel from Wellington to the Goolwa Channel in less than 4 months..

This solution means:

- Fresh water frontages are maintained
- Evaporation of sea water in the lake instead of fresh
- Fresh water continues to be discharged into the southern Coorong
- Boat access continues to the Coorong via Goolwa Barrage
- Fresh water returned to the reeds
- Fresh water fish will return to channels
- Acid sulphate suppressed by both fresh and salt water
- Adding the Lake to the tidal movement will keep mouth open
- No need to dredge the mouth ad infinitum (ie save \$5mill pa)
- All the river and lake available to recreation albeit the lake via Coorong

There is already damage to be addressed (is ASS) which has to be treated with bio mediation (composts and hay) and with lime.

In the interim, until the bund is completed, measures have to be taken to stop the water dropping further thereby exposing even more ASS.. This would entail a controlled opening of the barrages to simply maintain the water level so the fish have time to retreat up river and the reeds are not killed off. When the fresh is reintroduced the fresh water fish return to the channels and the reeds can recover.

It would be wise to construct the channel down the western side of the lake first from Wellington to the eastern end of Hindmarsh Island (ie to join up to the Goolwa Channel.) as it is the area worst affected by the ASS The time frame depends on how many excavators and dredges are employed in creating the channel and bund but it would not be longer than 4 to 6 months. A pilot channel would be created at first to carry the fresh water and the dredges can keep working widening and deepening the channel whilst heightening the bund. Whenever the dredging encounters Acid Sulphate Soils lime can be added directly to the dredging sludge as it is delivered onto the bund.

The time frame for the other channel would be a year and would require specifically designed structures at the mouth to Lake Albert so that fresh water is channelled around the outside and remainder of the lake is salt.