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Australia north to south water transfer plan to expand agriculture, mining,energy & regional growth.

Over years of intermittent drought many plans have been made to store seasonal water in dams on our east and west coasts to cope with urban and agriculture demands. Apart from the Snowy mountains river scheme which supplies hydro water to rivers for later use in irrigation, few of these plans have been carried out after drought is followed by normal rainfall . During the 2002-2009 drought, which had devastating effect on many farmers, Terry Bowring CEO of above group decided to look into water systems used by his previous USA employer, Green Giant, to cope with water needs for their 55 quality vegetable growing regions between E/Canada and the western states of USA.Contacts made with engineers from the Central Arizona Project surprised him that documented water losses from their 520 km concrete lined canal through hot semi desert country amounted to 1.7% pa.. Labour and equipment cost estimates from canal contractors indicate capex and operations costs to construct canal in Australia should be well below the cost of piped water transfer.

Since 2009 the rise of the Asian consumer has presented opportunities to expand outputs of our traditional exports into consumer markets that are relatively close to Australia. The potential to open our northern land to take advantage of monsoonal rains for agriculture to Asia has been suggested. Agriculture in the upper north tends to concentrate on live cattle export and C4 crops such as sugar cane. With issues of water inundation of farms and roads affecting the time involved to get farming in this region operational, it appears initially more sensible to move water to a wider range of existing agriculture further south, they can produce outputs earlier.

North to South Canal construction

The attached presentation map Oct 12, indicates an early plan to move water north to south. It proposes to join by tunnel, part of annual flow to sea of the Herbert river to the main flow of the Burdekin river. By so doing a "projected mean flow to sea at Ayr", from rivers would amount to 11,800 GL pa. We plan to store water in the Hells Gate and Burdekin Falls dams and to divert one third of water which normally goes to sea to proposed canal infrastructure. This diversion of 3890 GL pa amounts to a relatively small loss of mean annual seasonal water flowing into the Great Barrier Reef from seasonal rain, into land based rivers and creeks. As can be seen from map, the canal starting at Burdekin falls dam moves down to near Charleville where it turns east towards St George. Canal pump stations can be powered with gas from the Cooper basin, fed to multiple gas engines. This design offers two options to irrigate a wide range of farm land capable of producing crops and pastoral activity. The average delivered water cost from the main canal to Tocumwal would be ~$135/ML. With the canal and river route, entering the Murray river at Wentworth, average water costs along the Warrego would work out at ~$61/Ml. Canal flow rates in early stages would be 100 km /day and evaporative water losses 4%/1000km, the speed of transit helps to reduce losses. Our water cost estimates have been based on typical Federally financed canals in USA whose capital costs are paid back at 2.5% pa over 50 years, with the elected canal operators paying for all operational costs. Of these two routes, the main canal going south to the Murray at Tocumwal, passing through a wide range of existing farming country where with available food processing infrastructure, it is well suited to begin expansion of value added agri/food produce for Asia. If this canal was Federally funded (minimal GST)preliminary capital estimates for the main canal only, would run close to~ $9bn, if the subsidiary canal indicated were to be included, capital could increase by $2-3BN. Since putting forward this preliminary design, spatial drafting of alignments have seen opportunities to change route direction slightly in upper north,, to work around some early range country. A minor route variation further south indicates there may also be possibilities to enable gravity flow most of way to Charleville.
Another option currently being worked upon is the potential to introduce an alternate Qld canal route between the Burdekin Falls dam and Goondiwindi. (See attached canal presentation map E-Qld, dec13). From aerial observations during the current Qld drought, land along this route appeared to be greener than land further west, and as such may better suit agribusiness-objectives. Route alignments to Goondiwindi and further on to Moree and down to the Murray, as before, look to be suitable for canal construction, gas for power should be available from Gladstone. Some flooding issues and how to work around dust from open cut coal mines in the region still need consideration. At this stage this alternate route looks to have strong future potential. Other canal and water storage operational opportunities still worthy of further investigation are indicated below.

North to South Canal, water utilisation opportunities

"Storage of water in the Gilbert River Formation aquifer". BRS hydrologists who spent 5-10 yrs working on GAB near Hughendon, consider it could hold up to 20,000 GL of "no evaporation water". Evaporation losses in N/Qld open dams is typically 21-25% pa. If areas of high permeation can be found near or around this aquifer it has potential to drought proof regional farms and towns in NW/Qld as well as those further south.

The potential to drive canal pump stations by PV solar power with arrays over or on side of canal is possible. To keep water flowing 24/7, some of water pumped during the day will be held in earthen dams near pump stations and released at night. PV Solar arrays over length of canal could generate up to1.5 Gw for a range of power needs. Adding solar, & hydro power along planned canal route, could add to needed NW/Qld power.

Open canals or rivers tend to develop algal blooms during summer. Most USA canals have set up sterile fish hatcheries along their canals to grow fish that eat surface algae. Similar systems should be introduced here.

Excavation systems used by US canal developers rely on available local contractors for supply. This labor is not as readily available here, and usage of surface miners to cut canal to shape 24 hr/day can be controlled by remote computer operation. Trials using Wirtgen plant at WA Fortescue Iron ore mine should prove potential.

Direct action to increase vegetation to rehabilitate soils, and reduce salinity, can benefit from new water. Cane toads and tilapia can be removed by filtration, also hot/ dry conditions further south will stop toad movement.

Worth evaluating if main canal water could be integrated with 800 GL water out of Clarence river in N/NSW

Government returns from canals will come from water sales, taxes from new agri/food businesses, new low carbon energy (shale gas), dam hydro power, carbon offsets from soil carbon and biofuels from crop wastes. Canal can be constructed in stages, as each stage is opened, water can be delivered for farming or other uses. Finance to make it happen can come from Federal/State public private partnerships, private or super funding.

Agriculture and Food Production in Australia

Australia agri/food business is largely about water management. With the age of our male farming community tending to be in 55-60yr range, and few siblings staying on farm, there seem to be future possibilities of joint venture aggregation of land with local or Asian investors to enable productivity improvements from increased volume. Effort will be made to direct canal routes over quality land. Where heavy soils exist, cultivation systems developed by N/Vic and CSIRO R&D, can improve yield & water holding capacity of heavy duplex soils by stabilising same with perennial rye grass and using GPS systems to avoid land compaction. Annual northern water supply will replace "Basin water buy-backs" by recovering water for irrigators and improving town water quality. The main canal water cost structure proposed, is at top end of what many growers will pay, when adequate water is available, this may require more efficient irrigation systems to be built into farming ie, centre pivots, drippers. By the end of this decade expected food demand from India, China and ASEAN countries will be high, items on top of the list will be value added beef, lamb and goat meat, with dairy, wine, vegetable oil, vegetables and coarse feed grain not far behind. These items can be intensively farmed on land either side of a canal, by using by pipe installed by local farmer co-ops . Depending on food to be exported, current delivery times to Asia need to be considered, 3- 4 week sea travel time in refrigerated shipping sea containers, stretches the limits of some use by dates. Development of fast moving refrigerated catamaran vessels has started in Darwin to reduce shipping time. To increase shelf life, ozone sanitation or high pressure processing may be considered for fresh meat, fish and vegetables. Some fresh produce coming out of NZ is now being flown out daily to Asia. To benefit from export of value added food sales to N/Asia, expanded involvement of local supermarkets will be helpful. At a Federal level, free trade agreements with Asia are important to reduce 15% tariffs of many China food imports. If our agribusiness community is interested in obtaining overseas JV finance to develop farm land, rates of FIRB private investment approvals should be reduced to competitive levels. Australian agribusiness operators need to address these issues now.

Energy, mining and Communication Opportunities

- Crop straw, idle land grass, tree biomass and MSW can be converted to ethanol and power using a recognised syngas fermentation technology for which we have agreements www.ineos-bio.com. This technology can recover nutrients in a dry form from crop wastes. Fast growing Mallee Eucalypts can be grown for fuel and power. Lignol in Canada has produced carbon fiber from wood lignin suitable for strong light car bodies, Deakin Uni (Vic) is working on carbon fiber from lignin and other inputs. Oil from camelina seed can produce aviation fuel, USA wheat farmers grow this as a 2nd annual crop. Where it is economic to cut back farm grass and palletise it for fuel, this will help eliminate a major source of bushfire fuel. Some of above should fit in with direct action plans to reduce emissions.

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- Canal water can be directed to frack shale gas basins in eastern states,. This is a technology that eg BHP is using in USA. Extra canal water into the Murray can be pumped to the Olympic dam instead of setting up plant to desalinate sea water. Shale gas and uranium have high future export potential.
- President Obama is encouraging development of PV solar hydrogen from water technology. Systems such as www.Hypersolar.com in USA is well advanced and they are 2/3rd of way in power output to split either potable or sea water into H2 and O2. Wollongong Uni (NSW) are also well advanced in developing a solar hydrogen prototype. Theoretically 10% of our N to S canal water flow could power a canal as well as producing all eastern state peak power demand when technology ready. What is on in N/Africa could also work between Australia & Asia. http://www.hydrogen.co.uk/h2/solar_pv.htm
- Cost to deliver canal water to east coast city dams is ~$1.2 Bn less than cost of producing desalinated water. As city water demand increases the option of using northern water may be more viable than expanding present capital city desalination plants. Savings could be used to lower cost of farm water.
- Some USA canals using fiber optic cable for controls, rent out fiber capacity for public broadband usage. Such usage could be an opportunity for NBN to reduce cost of fiber optics to 40 inland towns and at same time getting involved with water to regions now struggling with inadequate water supply.
- Bushfires need to be put out while still small. NASA in conjunction with US Forest services have devised systems to use multiple low level flying UAVs (or drones) fitted with infra- red cameras to transmit fire images to operator(s) who can view up to 10 UAV's 24/7 during the fire season. When a fire is located, a fast moving water bomber(s) is dispatched to extinguish blaze quickly. We consider introduction of multiple water based landing strips beside a 2100 Km canal should enable such a system to be introduced to reduce the potential of bushfires getting out of control. Fires in Australia cost the economy $18 bn pa, riskfrontiers@mq.edu.au, bushfires are a high component of these costs. The introduction of water landing strips as a part of canal construction should have large pay back.

The Future of Australian Agri/Food Exports to Asia.

When dealing with Asian food groups, reliability of supply is a factor they will consider when dealing with a country that is intermittently hit by drought. With China already venturing into food production in Africa and other parts of world, being close to Asia will only be the advantage we think it is, if we concentrate on producing reliable, healthy food that is competitively priced. Northern water can help improve the production of much of our future agri/food output, but the volume that can be irrigated is not large in terms of our land availability. Strategies need to be developed to optimise water use. For example, cattle producers in the north rely on large annual rainfall to keep farms viable, but they will always struggle in periods of drought. If they can concentrate on storing a certain amount of feed in reserve, as well as obtaining feed from regions that have access to canal water, this should cover their needs. Such arrangements require a range of cooperation and investment that is currently not present.

When up to 300 million people living in N/W China are urbanised, because their rapidly drying up ground water is no longer adequate for their agrarian existence, this, along with population expansion will create large demand for food imports. Chinese supermarkets have a wider range of food items than currently exist on our shelves, most items can be produced in Australia, but state owned food enterprises are reluctant to transfer production supply to external producers. This could change when they become a JV investor in future food production. To prepare to meet Asian food demand our agribusiness industry needs market research from trade delegations to begin assessing what and when products will be in demand and what is needed to meet Chinese quality and food safety demands etc. Overseas investors already see the potential in what we are looking at in water infrastructure and have put forward preliminary offers to finance part or all of what is being planned. We all need to be sure of returns, and we consider with government and industry assistance in financing local or overseas demonstration of what is required, results will be forthcoming. This is a time consuming way of getting started, but worthwhile in ensuring integrity of outcome. We and members of one of our partners, The Australian Water Exploration Company, look forward to further discussion on above.

Regards

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