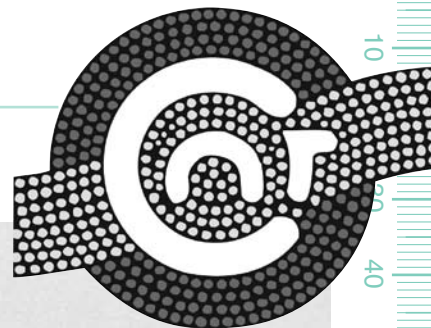


Windmills for water pumping



BACKGROUND

Windmill technology has been used in Australia for over a century, with major improvements made in the 1930s. Widespread adoption of diesel engines for water pumping since, and the rise in popularity of the solar pump over the past 15-20 years, has seen the number of windmills in rural Australia in steady decline. During the 1980's some State and Territory governments began a policy of decommissioning government windmill bores and replacing them with either diesel or later solar technology due to concerns over worker safety at heights. This eventually led to remote communities having only the choice of solar and diesel options whilst windmills continued being used by the private sector. Windmills are known to last 50 to 80 years with regular maintenance.

Many communities already have windmills in place that have been decommissioned, so there is potential to recommission the existing mill that is probably still on the bore in the community. Ensure that the bore has adequate water quantity and quality before recommissioning. It could be the case that the windmill stopped being used because the bore ran dry or the water quality has deteriorated significantly. Securing your water supply from source to points of use also means developing management plans covering hazard identification and rectification and regular repairs and maintenance of the pump the pipes and other hardware.

WINDMILL TECHNOLOGY

The technology consists of a steel three or four post braced structure with a shaft and geared mechanism attached to a large light weight fan, driven by the breeze, a tail trailing from the rear of the unit helps to steer the fan into the prevailing wind direction. The unit creates a reciprocal action with an arm running down to the bore. The bore, of approx 200mm diameter, is normally lined with a steel casing, and inside this casing is a second casing which would consist of 75–100mm pipe, in 3–6m segments threaded together, almost the entire length of the bore threaded on to a pump casing. The pump is usually made of brass and is a piston type.

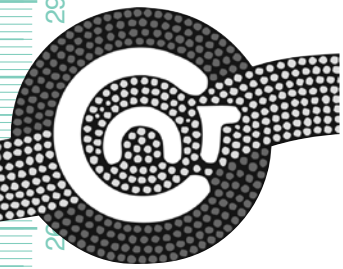
Major improvements have recently been made in the bore casings such as polypropylene casing liners and these poly pump housings last considerably longer than steel as steel corrosion in any bore system can be caused by the high salt and mineral content of groundwater.

COMPARING WINDMILLS TO DIESEL AND SOLAR PUMPS

Diesel pumps: The bore structure required is the same as that of a windmill, except that the pump required is a rotary action. A diesel or petrol motor usually drives a pump off a belt system through a pulley and housing mounted at the top of the bore. A shaft similar to that on a windmill drives a positive displacement pump at the bottom of the bore.

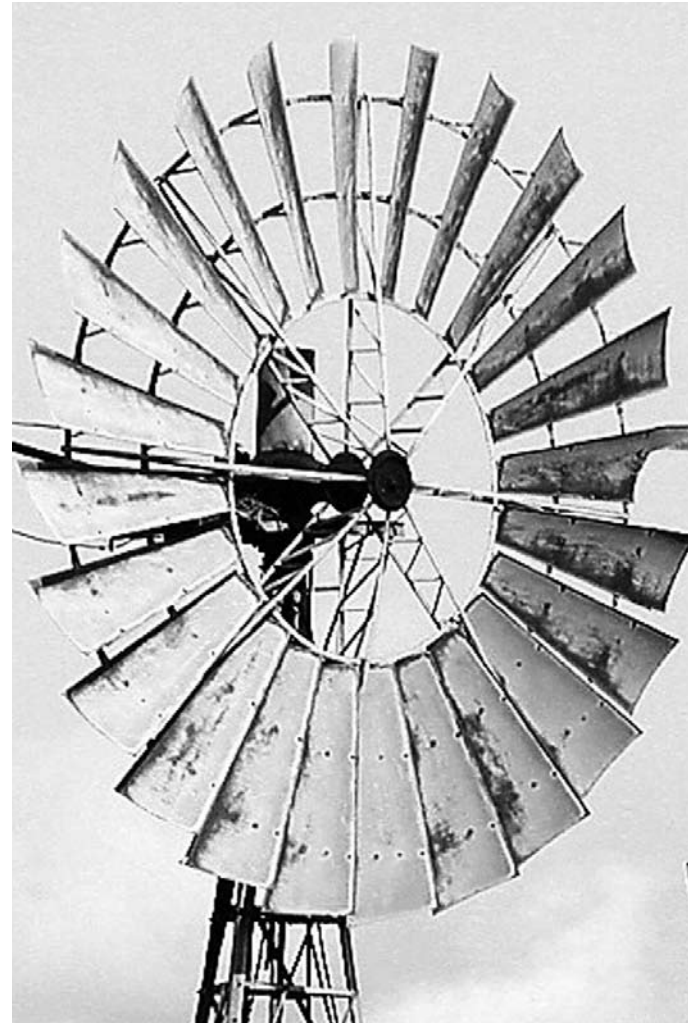
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BUSH TECH #38

Windmills for water pumping



Solar pumps: These pumping systems are still the most expensive in initial outlay but renewable energy rebates make them more cost effective against diesel powered pumping. The modern system comprises of polycrystalline photovoltaic (PV) cells. In simple terms it turns sunlight into electrical power, and a power lead and water line run down to a submersible pump, usually a multi stage pump.

The upfront costs of diesel pumps and windmills is similar but the longevity of windmills makes them far more economical over the long term. Whilst people with skills in windmill maintenance are fast disappearing, the potential for people re-gaining such skills if training programs were to be developed is high. Windmill servicing and maintenance is largely a mechanical process and doesn't need the more specialised skills sets that are required for servicing and maintaining solar or diesel pumps. (*More information about bore maintenance can be found in Bush Tech 21*).

ADVANTAGES OF WINDMILLS

- \$0 day to day running costs;
- Longevity;
- Design life is 20–40 years, however by keeping the windmill well maintained they may last 70 to 80 years;
- No special skills needed for regular maintenance;
- Cheaper than solar for original purchase. \$4000 to \$13000 with the average costing \$5500;
- No fossil fuels required for running;
- Annual maintenance costs target is approx \$200.

DISADVANTAGES OF WINDMILLS

- Dealing with a technology that some feel has had it's day;
- At present spare parts can be difficult to purchase;
- Difficulty in arranging servicing as there are not enough windmill contractors any more and those that are still practicing their skill are aging;
- They are also not portable.

FUTURE POSSIBILITIES FOR WINDMILLS

When making a decision on using windmill technology in your community, important factors to be taken into account are: system reliability, life cycle, annual cost, skills needed for maintenance and the availability of those skills. Other important decisions that can influence your choice is whether you already have a decommissioned windmill in place and whether the existing bore is viable in terms of both water quantity and quality. Reconditioning costs are less expensive than initial purchase of a new windmill or diesel and solar alternatives. It appears that the cost

imperative may in time result in a resurgence of windmill technologies and people with the skills to maintain them.

No other technology that was designed to replace the windmill can come anywhere near it for longevity. When you spread the annual maintenance cost over the lifetime of the equipment no other technology even comes close. Many existing windmills are in are poor state of disrepair but a few thousand dollars each would have them functional.

Windmills are a mechanical system so the people that choose this technology as an alternative must remember that it will need regular attention and that means 2 or 3 times a year someone will have to climb up it and put oil in the oil reservoirs and check for faults.

FOR MORE INFORMATION

Websites, books, supplier
 Cometwindmills.com.au
 Qldwindmillandsolar.com.au
 Mowara District historical society and Museum
 Worksafe.nt.gov.au
 History of Solar energy: www.solarenergy.com/info_history.html
 BUSH TECH #21: Water bores
 Queensland Government Natural Resources Mines and Energy