Inter Basin Water Transfers in large quantities and over long distances by flexible underwater pipelines

Felix BOGLIOLO Chief Executive Officer

Claude LEBELLE Chief Technical Officer

Overall, there is enough fresh water on our planet but it is not available where needed. Water availability locally, already an issue today, will become a major problem over the next few decades due to the anticipated global population increase: about 3 billion more. This problem is even more acute in coastal areas where about two thirds of the world population lives. Cities grow at a still faster pace due to rural emigration. Local water resources can no longer support this growth. Also, more than ever before, global availability of foodstuff is a top priority. UNESCO estimates that 40 millions new hectares will be needed for agricultural uses which will require an increase in irrigation of 8,000m^3/s. As deforesting subtropical areas is not an option, "turning deserts into orchards" should be considered.

Increasing locally water resources at an affordable price will solve both these problems. But, all existing solutions suffer from major flaws. Desalination costs only marginally less than 1€/m^3; it is available only for limited quantities of 1-2m^3/s (both parameters preclude its use for agricultural purposes); its energy consumption is greater than 3kWh/m^3 (an environmental heresy in today's global warming context); its operation requires a highly skilled workforce. But, why "produce" fresh water when it already exists? Wouldn't it be more logical, just to transport it? However, today, traditional onshore inter basin transfers cannot be carried out or even continued because they are difficult, ecologically problematic (particularly downstream) and costly to implement. Other exotic solutions (e.g. tankers) are very expensive (>2€/m^3) or can be used only for limited quantities (1m^3/s ~ 1 tanker of 100.000t/d). Therefore, innovative alternative solutions should be considered.

That's the purpose of our proprietary system **submariver®.** Available water at river mouths is abstracted just upstream the salt wedge (no more downstream issues). It is transported by underwater pipes parallel to the coast (across the sea for islands). At destination in coastal areas, it is distributed through the local network after usage-specific treatment (drinking water, industrial or agricultural needs).

This patented system allows transportation of water in large quantities (from 1m^3/s up to several dozens) over long distances (from a few dozens kilometers up to several hundreds). It is structured around a flexible pipe that follows the seabed profile without preparation of the ground. It is laid on the seabed (at any depth but typically at -200m) and ballasted. Projects transferring any volume over any distance can be considered: larger volumes require more parallel pipes beyond the two that are always considered for security reasons; longer distances require intermediary pump stations which can constitute so many supplementary abstraction or delivery points.

This new system is very competitive. It is not only an alternative to traditional techniques; it can also be a solution to water problems where none exists today. The all-in cost of transportation is less than 0.4€/m^3 in most cases allowing agricultural uses. Its energy consumption is less than 0.5kWh/m^3 in most cases thus more environment friendly and less sensitive to energy price. Its construction can be conducted at a pace of more than 2km per day. It is simple and sturdy without external technological dependence.

More than two dozens applications have been identified after a limited market study. They cover all continents totaling several thousand kilometers of pipes. Many are located within the Mediterranean Sea.

These "water highways" (to quote Mr. Loïc Fauchon, Chairman of the World Water Council) or "submarine rivers" (as we call them) can solve many water and food issues around the world in the forthcoming decades, thus fostering economic and social development in the destination areas.

Water, via-*marina*: life!

3, rue Michel Voisin-92330 Sceaux-France – Ph: +33 1 40 91 93 00 – email : info@via-marina.com - www.via-marina.com