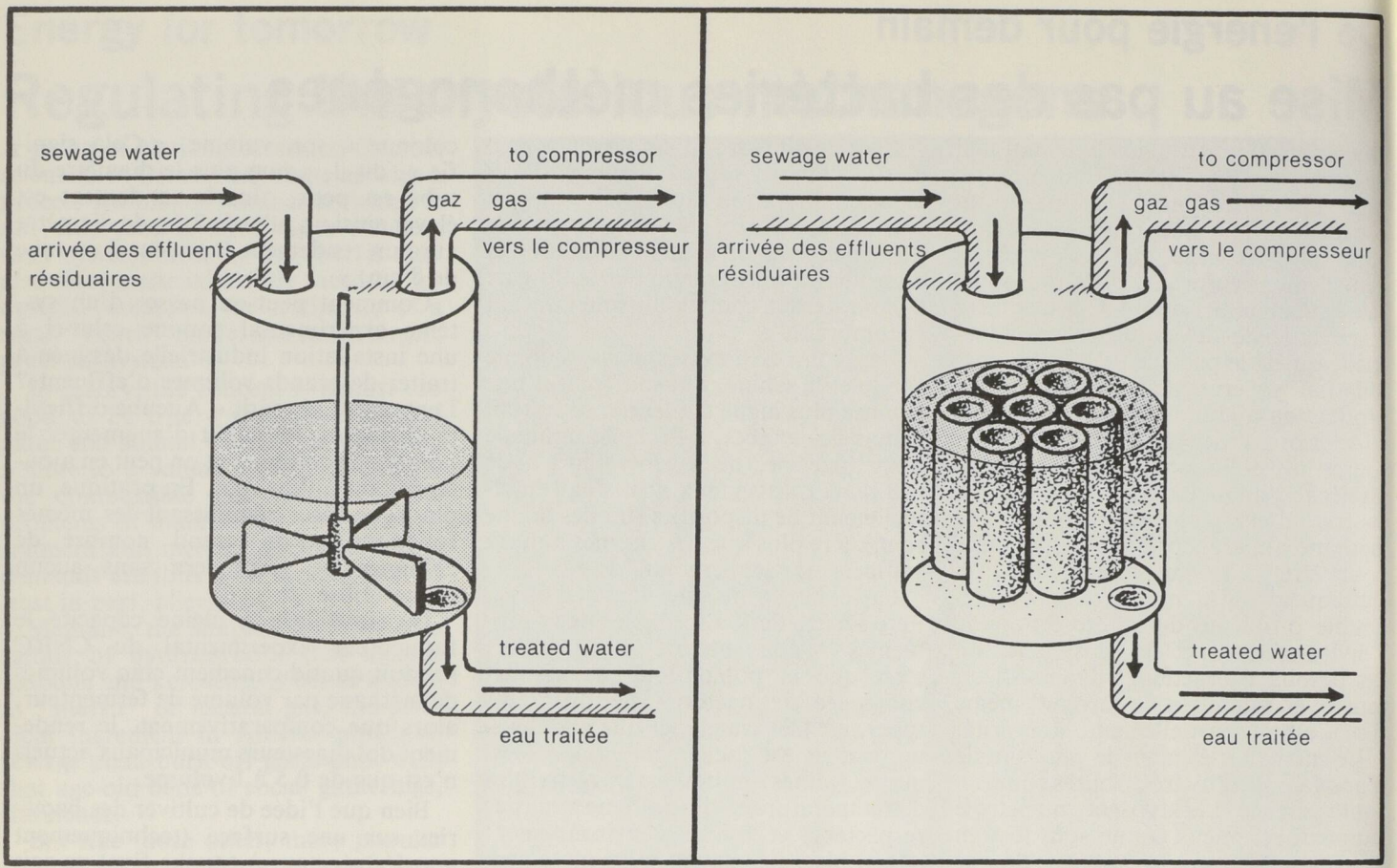

Methane gas production from organic wastes, the current way (left) and by a new Canadian method (right). These simplified representations compare the standard, paddle-wheel means of mixing sewage and methane-producing bacteria with a technique where the sewage flows through a bank of columns coated with the bacteria. This "fixing" the bugs to a surface makes the process up to ten times more efficient and promises to turn society's organic wastes into a significant source of energy. *(Graphic: John Bianchi)*

Fabrication de méthane à partir de matières organiques, par la méthode classique (à gauche), et à l'aide d'une nouvelle méthode canadienne (à droite). Cette illustration simplifiée permet de voir la différence entre la méthode classique, faisant appel à un agitateur pour mélanger les effluents résiduaires avec les bactéries méthanogènes, et une technique où on fait passer cet effluent dans une série de colonnes de verre dont la surface interne est couverte d'une couche de bactéries. La « fixation » des micro-organismes sur une surface multiplie par dix le rendement du processus et promet de transformer des déchets actuellement inutilisables en une importante source d'énergie. *(Schéma: John Bianchi)*

on a surface rather than allowing them to swim freely in the waste, they came up with a system that produces up to 10 times more gas than fermenters now in use. Comments Bert van den Berg: "What we have developed is a bank of glass tubes through which the waste flows. The bacteria grow on the internal surface of the tubes, thereby maximizing the essential waste-bacteria contact. Equally important, you don't lose the bacteria in the cleaned-up waste waters."

Lentz established that the system's efficiency hinged on the relationship between the inner surface area and the volume of the tower. "What this means is that the smaller the tube diameter, the greater the efficiency – a 2 cm diameter, for example, is superior to an 8 cm diameter."

How can such a system be scaled up to industrial size for handling large waste volumes? "In principle it should be simple," says Lentz. "Just increase the number of tubes – as many as you like. In practice, a light-weight plastic material, working like a large number of glass tubes, will no doubt be used."

Operating at its peak performance, the NRC lab-scale fermenter produces five volumes of methane per volume of fermenter each day, compared to the 0.5 – 1.0 volume range currently achieved by most municipal sewage digesters.

Though the idea of bacterial growth on a surface (technically called a "fixed film" reactor) is not an NRC idea, the Ottawa team's tube system represents an improvement over existing techniques. Such devices, collectively referred to as "anaerobic filters", have achieved only limited success because the bugs do not stick to all of the surface, waste waters tend to channel, and plugging occurs due to solid particles. Lentz and van den Berg's tube system not only seems to improve adherence of the bacteria to surfaces, but by admitting the waste waters from above, rather than below as is commonly done, the problems of channelling and plugging are avoided. The Ottawa scientists are now using a larger version of their reactor in Burlington, Ontario, to produce methane from the waste waters of a Canadian canner's plant. The preliminary results are promising.

While NRC is at the forefront of biogas production research, spending upwards of $1 million per year in research, other laboratories, notably at the Universities of Manitoba and British Columbia, are also in the field. In fact, Manitoba has a truck equipped with gas cylinders that runs solely on methane produced from pig manure. In Colorado, U.S.A., a much more ambitious project has been set up by Monford Industries to produce and utilize methane from the manure of a 175,000-head cattle herd. With fossil fuels running out, methane production from the breakdown of organic wastes is no longer the uninvited relative of the renewable energy family. With developments in technique, it has the potential to become a valuable and dependable element in meeting future energy needs.□

Wayne Campbell