Glycerol Production by Novel Strains of Dunaliella and Asteromonas isolated from Namibian marine water

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Innovation: Glycerol is a new biofuel underpinning a commercial CHP technology using the novel (2010) Mcneil combustion cycle. This allows standard production compression ignition engines to combust glycerol at high efficiencies and with low emissions without chemical alteration or the addition of combustion enhancers. Combustion is more energy efficient than any known fossil, bio or synthetic fuel; engine performance with glycerol has been proven and in diesel engines glycerol produces no combustion particulate, no SOx, reduced primary NOx, extremely low VOC and aldehyde emissions and no catalyst poisons: these parameters have been independently verified. Glycerol also has safe handling properties: it is water-soluble and bio-degradable and holds the key to developing an entirely new environmentally-sustainable, biofuel industry. In the biorefineries of the future glycerol will also serve as an intermediate to replace various fossil oil-based bulk chemicals.

Glycerol is chemically produced from biodiesel manufacture using plant oil, but halophytic microalgae of the *Dunaliella* species that grow in highly saline environments such as salt pans and desalination non-potable waters across the globe will also synthesise glycerol. *Dunaliella* has been cultivated at commercial-scale as a source of β-carotene and animal protein but not as a source of glycerol.

Aim: to develop a low-cost system for producing industrial quantities of glycerol in pure streams from halophytic microalgae. using halophytic microalgae isolated from marine water of Namibia.

Results:

- *Dunaliella* and *Asteromonas* strains isolated from saline marine water in Namibia were genetically distinct from all other known *Dunaliella* strains
- Namibia strains of *Dunaliella* are adapted for growth at high temperatures (30^0C)
- On exposure to hyperosmotic shock the amount of glycerol produced as a function of cell density greatly increased
- Doubling times and specific growth rate μ provide the basis for modelling production systems to produce industrial quantities of glycerol in Namibia