

Kingdom Report

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Kingdom Policy: The Biofuels Revolution and Poverty Relief

Southern Africa can become the Saudi Arabia of the biofuels revolution creating millions of sustainable jobs for the poor, eliminating carbon emissions and rebuilding our rural communities. The Church needs to catch this vision.

Let me give you several headlines that came out this week:

SA missing out on biofuels boom in Europe, says EU trade representative

BL PREMIUM

09 June 2021 - 19:32 Bekezela Phakathi

UPDATED 09 June 2021 - 20:14

SA is sitting on a potential gold mine as the need for bioethanol, an alternative to petrol, grows across Europe, driven by the push to curb climate change, says an EU trade representative in the country.

The global bioethanol market was valued at just more than \$53bn (R719.21bn) in 2018, and will amount to an estimated \$77bn by 2022. Its growth is expected to explode as the drive towards cleaner energy accelerates globally.

Ambitious new emissions targets to change SA energy plan

Climate commission to push for higher reduction goals

BL PREMIUM

10 June 2021 - 05:10 Carol Paton

The presidential climate commission is to recommend that SA adopt more ambitious emissions reduction targets than the government has proposed, which would entail changes to the country's energy plan and a quicker phase-out of coal-fired power.

The commission was established in September last year to co-ordinate the country's transition to a low-carbon economy and build consensus among social partners for a "just transition". It is chaired by President Cyril Ramaphosa with former cabinet minister Valli Moosa as his deputy.

Dutch Court Orders Shell To Aggressively Cut Carbon Emissions In Landmark Decision

Thursday, May 27, 2021 - 2:40

*... companies to accelerate its green commitments. Royal Dutch **Shell** has just lost a landmark case brought by environmental ... its greenhouse gas emissions more aggressively: by 2030, **Shell's** net carbon emissions needed to be 45% lower than 2019 ... and carbon neutral by 2050 ...ruling could have "far-reaching consequences" not just for **Shell**, but for its competitors as well.*

Let me summarize for you the above:

- 1) There is a massive local and international market for biofuels derived from renewable biomass. Europe and the rest of the world is keen on it but they do not have the land area to supply their needs. They need to import from places that have lots of land for agricultural production e.g. Southern Africa.
- 2) South Africa is the 12th largest carbon emitting economy in the world and for our government to meet their Paris Climate Accord agreements they need to come up with a plan to cut our fossil fuel use.
- 3) The international trend now is to force the large oil companies to cut by 50% their oil production. The only way they can still stay in business and comply if for them to drastically increase the blend of biofuels in their production.

As you know I am not a believer in the "climate change" agenda but I am passionate about two things that have bearing on the issue:

- Renewable fuels from biomass conversion technologies into alternate fuels like ethanol and butanol.
- Poverty relief by providing the mass of unskilled jobless in Southern Africa with meaningful jobs that provide dignity and income through fruitful labour.

I have been working on biofuel technology for many years. I developed years ago what I called a "Farm Scale Ethanol Production Plant" that was capable of producing 100,000 liters of raw ethanol per month. These would be operated by rural communities and they would sell their production to large fuel companies who would refine the raw ethanol into fuel grade ethanol for inclusion in the nation's fuel supply.

I have tried through the years to interest the national, provincial and local governments in this as job creation program. No success. In fact you cannot even get a letter or email response or a meeting appointment.

The facts are that South Africa uses about 10 billion liters of diesel per year and 10 billion liters of petrol per year. We can easily replace 1 billion liters in diesel and 1 billion liters in petrol with ethanol. That would require 2,000 rural village ethanol production plants.

The feedstock you could use to make the ethanol would be either grasses like bagasse or straw or grasses or you can use a starch source like sorghum that grows in dry areas. You get 250 liters of ethanol per mt of grasses and 450 liters from 1 mt of sorghum plus 350 kg of high protein animal feed. In places where you can plant cassava you get really high production as starch will give you 600 liters per mt.

The far better biofuel is Butanol. The energy density of the various fuels are as follows:

Petrol : 32 MJ/l

Butanol 29.2 MJ/L

Ethanol 19.6 MJ/L

The fact is you can just run your current car engine unmodified on butanol.

Below is my demonstration plant I built at the Agricultural Research Council Pretoria facility years ago. The people with me were a delegation from Anglo American interested in the project at that time.



Let me explain technically why biofuels are carbon neutral and endlessly available:

The leaves on a plant through the process of photosynthesis take carbon dioxide from the air and combine it with water from their roots and with the energy supplied from the sun they take each molecule and break it down to carbon and hydrogen and oxygen and then reassemble them into a molecule of Glucose. Which is a sugar that is made up of 6 carbon atoms and 12 hydrogen atoms and 6 oxygen atoms.

The plant then takes these glucose sugar molecules and string them together to make cellulose.....which is the leafy stalks that you see in your plants or in grains they string the glucose sugars to make starch.

When we make biofuels we take either the cellulose from grasses or the starch from grains and cut up the cellulose and starch back into its original glucose sugars using acids or enzymes Your stomach can do that when you eat bread, the starch is broken into glucose using your stomach acids. Cows use an enzyme called cellulase to break up the grass into glucose sugar. Glucose is the energy source you and the cow need.

We then feed that glucose sugar to different kinds of yeasts and bacteria that can make different kinds of chemicals. The yeasts take the carbon and oxygen and

hydrogen in the glucose and reassemble them into new chemical configurations. Ethanol needs 2 carbon atoms, butanol needs 4 carbon atoms.

Now here is the neat part. When your engine burns the ethanol or butanol what comes out is carbon monoxide and carbon dioxide. This goes into the atmosphere where plants capture it again to make glucose sugar all over again. That means that the fuel is carbon neutral, there is no added carbon being added to the atmosphere. If you use oil or coal or gas to make your chemicals and fuels you are taking carbon out of the ground and burning it and sending it into the atmosphere to add to the CO₂ there.

And whereas coal and oil are not renewable sources of energy but plant cellulose and starch are always renewable as long as the sun shines and we don't pave over the planet with asphalt and cement.

We can provide millions of jobs across Southern Africa making glucose syrup and shipping it in huge oil tankers that used to take oil to EU refineries can now take glucose to be fermented into fuel and chemicals. Any chemical that you make out of oil or gas or coal can be made out of biomass. We call this the transition from the Hydrocarbon Economy to the Carbohydrate Economy. The one is polluting the environment and is not renewable....the other is dependent on a living healthy plant environment and it is endlessly renewable....but it needs millions of farm workers.

The Hydrocarbon Economy needs big money in coal mines and oil rigs and fracking. The Carbohydrate Economy needs millions of farm workers, lots of plants and trees and biomass and care for the land. That is why Southern Africa can become the Saudi Arabia of the world. The place where billions of barrels of glucose are shipped world wide to supply the new generation of bio-refineries that will spring up in Europe, China, Japan.

What is exciting to me is that the biotech revolution of the last 10 years have dramatically impacted the ability for scientists to engineer yeast and bacteria strains that are put together in such a way that a myriad of new chemicals can be created through what is known as Precision Fermentation. Every year the cost of making fuels and chemicals from glucose sugar keep falling.

Here is the challenge for us as a country and as a church.

The previous National Party white government in South Africa launched the world's biggest synthetic fuels and chemicals company Sasol in the 1950's using coal as the feedstock. The world mocked and said it will never pay off. 70 years later and Sasol is a huge profitable company that has contributed greatly to job creation and wealth creation in its history. But those days are coming to a close.

We need another new bold step. We need a national commitment to make our nation's fuel and chemical requirements from biomass materials. All the various chemicals and fuels that Sasol is now making from coal, can be made through Precision Fermentation from glucose. But instead of 40 million mt of coal for feedstock we will need 40 million mt of biomass. Supplied by rural poor who are paid for every tonne of grass they grow and deliver to collection points where the biomass, whether starch or cellulose will be turned into glucose syrup. From there

tankers will take the glucose to many fermentation plants that will be producing all the range of fuels and chemicals we need and extra to be exported to Europe.

Here is another tipping point you might not know. The Cape Town refinery is shut down since last year and so is the large Sapref refinery in Durban. Our old refineries can no longer produce the sulphur free fuel that modern engines require. So more and more of our fuel is just being imported straight from international big refineries. The 20 billion liters of fuel we use is more than R200 billion that is flowing out of the country every year. Imagine that massive income being directed into our farming and rural communities. And now multiply that many times over as all our Southern African community nations join in and start producing glucose syrup for export to the world.

To the Church:

The Lord told Israel how to create jobs for the poor:

Lev 23:22 *And when ye reap the harvest of your land, thou shalt not make clean riddance of the corners of thy field when thou reapest, neither shalt thou gather any gleaning of thy harvest: thou shalt leave them unto the poor, and to the stranger: I am the LORD your God.*

When this was written and proclaimed by the Lord, agriculture was 90% of the GNP of the Israel nation. What the Lord is saying is that a certain portion of the productive output of the national economy must be set aside as job creation for the poor. The Lord is not saying, after you bring in the harvest which is the income of the nation, set aside a certain portion of that and give it to the poor and the stranger as a welfare handout. He says give a certain portion of the productive economy of the nation for the poor to work and reap the economic benefit for themselves through work. That will allow them to work their way out of poverty.

I appreciate what churches and welfare groups and government are doing to distribute welfare to the poor, but people need to work....they need work for the dignity it gives a person, they need it for the character development it produces, the young people especially need to grow up with an ethic of work and the connection between production and consumption.

God tells Israel, give the poor work to do! There are many 'work scheme' ideas from government and industry. But I believe the church in South Africa needs to get into this issue. So here is my interpretation and application of this scripture for an economic prosperity revolution for Southern Africa:

We need to ask ourselves: What can the poor do that we can give a portion of our national economy for them to contribute their labour?

I say let's switch Southern Africa from a Hydrocarbon Economy to a Carbohydrate Economy. Our rural poor can grow all manner of crops if we give them a market and support. Turning 7 million jobless into 7 million income earning workers will be an incredible boost to our national economy and government revenue needs.