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# Zero Emission Vehicles-By Carbon Recycling Using Nanotechnology

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**Abstract:-** Over the past few years, a small word with big potential has been rapidly insinuating itself into the world's consciousness. That word is "NANO"(one-billionth of a meter).It has conjured up speculation about a seismic shift in almost every aspect of science and engineering with implications of ethics economics, international relations, day-to-day life and even humanity's conception of place in its place in the universe. Nanotechnology is the science and technology of building devices, such as electronic circuits, from single atoms and molecules. Petrol, which is available inadequately, is considered to be one of the most time sources of energy. Our paper focuses on the prospect for zero emission hydrocarbon fuelled vehicles with sustainable carbon cycle using nanotechnology in which exhausted petrol is recycled again and again. This process involves two phases,

**Phase 1:**
- Nan platinum strip-An air separation unit
- Carbon liquefaction process

**Phase 2:**
- Carbon recycling.

This project allows for perfect carbon recycling, thereby eliminating the requirement for fossil fuel use in transportation.

## I. INTRODUCTION

NANOTECHNOLOGY one of the emerging field in the future development of materialism. This project emphasis on building a cleaner environment using nanotechnology. Global warming due to CO2 in the atmosphere remains an unproven threat to the quality of life of future generations. It is apparent that over 20% of world-wide CO2 emissions arise from transportation being mostly due to the burning of fossil-fuel derived petrol(Gasoline) in Internal Combustion Engine(ICE). In this brief outline, we put forward the concept of the "ZERO EMISSION PETROL VEHICLE" using NANOPLATINUM filter which converts the harmful carbon-monoxide into CO2 which is the integrant which we want in the recycling of petrol. This uses conventional ICEs ,but, by closed cycle combustion(CCC),it is possible to store liquefied CO2 on board.

**2. Phases:**

There are two phases in this process

**Phase 1:**

- **Nanoplatinum strip:**

1. In this unit the exhausted gas is filtered from the toxic gases & CO2 gas is separated using a strip of platinum of nano scale.
2. The strip in the shape of filter acts as a catalyst in the process of converting the CO into CO2 which is the required integrant we need to recycle.

- **Carbon liquification process:**

1. The filtered gas is then mixed with oxygen & is liquefied by compression to 70 bar at or below $30^0$ C.
2. By doing so the liquid carbon is acquired & stored in a separate tank.

**Phase 2:**

- **Carbon recycling:**

1. In this phase the liquid carbon tankered in the service station is subsequently recycled by hydrogenatation in a configured refinery.

2. CO2, which is tinkered from service station to refinery by making modifications to the existing distribution infrastructure.
3. In the refineries the liquid CO2 is converted into methanol & then to petrol using cracking & fractional distillation.
4. The petrol produced is taken to service station & then to vehicles.

**Nanoplatinum filter:**

This unit can be a part of air separation unit. The nanoplatinum filter is actually a strip of platinum placed at the emission state of the vechicle.This acts as a catalyst, which assist in the reaction of converting the toxic nitric-oxide and carbon-monoxide into nitrogen and CO2.This process is as follows. The process is so simple that when nitricoxide lands on the platinum the N2&O2 atoms bond to the platinum atoms, breaking up the nitricoxide molecule. In the similar way the O2 atoms bond with CO molecule that have attached to the surface of the platinum & the result is CO2, which is the desired integrants in storing the liquid carbon. The platinum strip redesigned such that each strip should be able to interact with each atoms of N2O &CO.The ZEPV concept utilizes a petrol fuelled, closed cycle internal combustion engine(CCICE) and requires that the exhaust CO2 be liquefied, and stored on board in the periods between refueling.Inorder that the exhaust gases can be conveniently & easily liquefied, the N2 is removed from the inlet air stream in a miniature AIR SEPARATION UNIT(ASU). This means that the engine can be operated lean, as the need to reduce NOx emissions is eliminated. Lean burn engines have much reduced CO & HC emissions.

## II. COMPONENTS DESCRIPTION

**Nano Platinum Filter**

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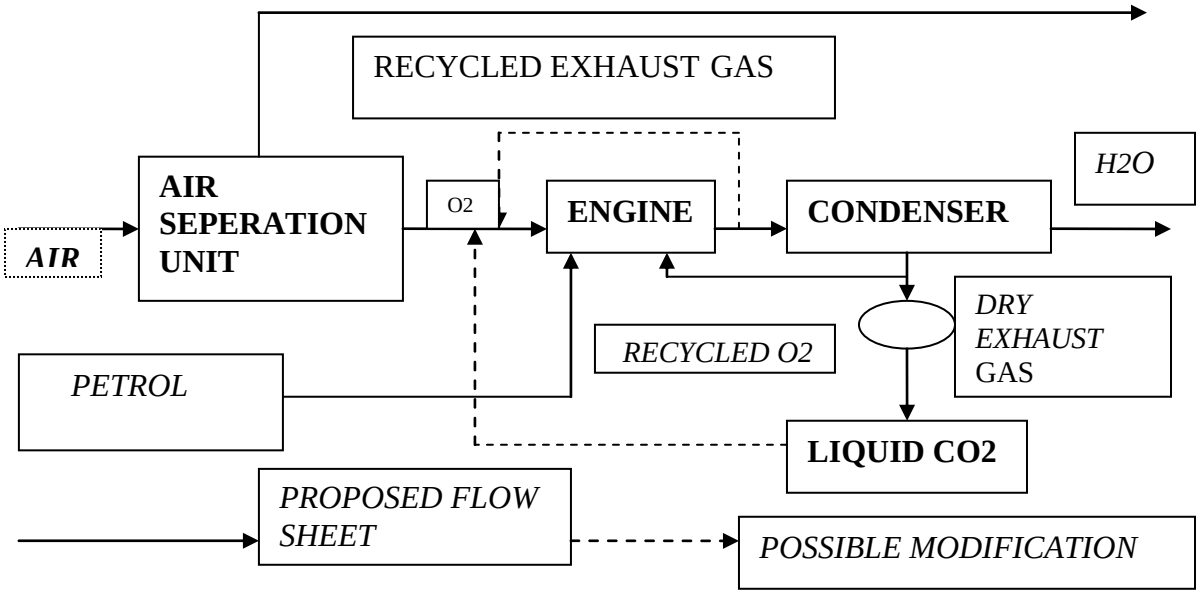



**Fig 1.Schematic Diagram of Closed Cycle Combustion For An Ice**

The use of exhaust gas recycling in order to regulate combustion temperature, in the absence of the heat capacity of the N2 found in conventional ICEs. The use of water vapor as a diluent has been demonstrated by QUADAR to reduce fuel economy to a lesser extent than a CO2 diluent.

**Carbon Iquification process:**

CO2 is stored in liquid form & it achieved at ambient temperature by compressing the exhaust stream purged from the recycle loop. If the H2O contains minimal dissolved pollutants it can be vaporized & released harmlessly to atmosphere. A possible modification to the proposed scheme is to recycle this stream back to the inlet manifold, in order that the O2 content can be utilized. A small purge stream would still be required in order to prevent the buildup of other non-condensable, such as Argon & N2 present as impurities in the feed from the air separation unit.

**Carbon recycling:**

The CO2 produced by ZEPVs is to be off loaded at specially adapted service station during refueling. The two strategies considered with this is Sequestration Recycling.

Almost all CO2 sequestration is currently used in ENHANCED OIL RECOVERY(EOR). Alternative methods of sequestration include storage in geological formations on land, pumping it to the old oil & gas fields or ocean disposal.

The petrol for the vehicle would be a synthetic fuel produced in a refinery from recycled CO2 & H2O. The major infrastructure changes required would be on the service station forecourts, where pumps would have to be modified to dispense fuel & receive a high pressure liquid CO2 stream.

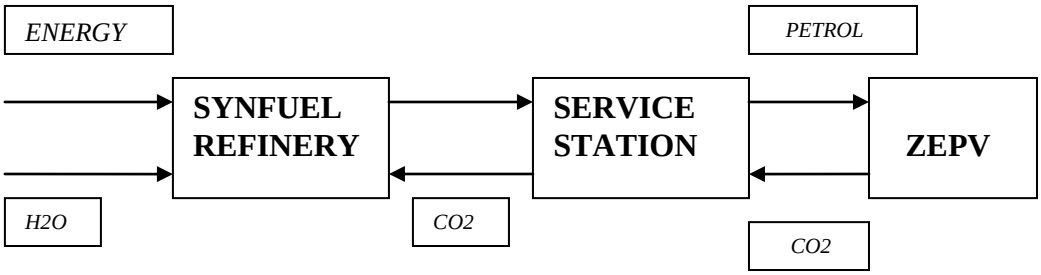
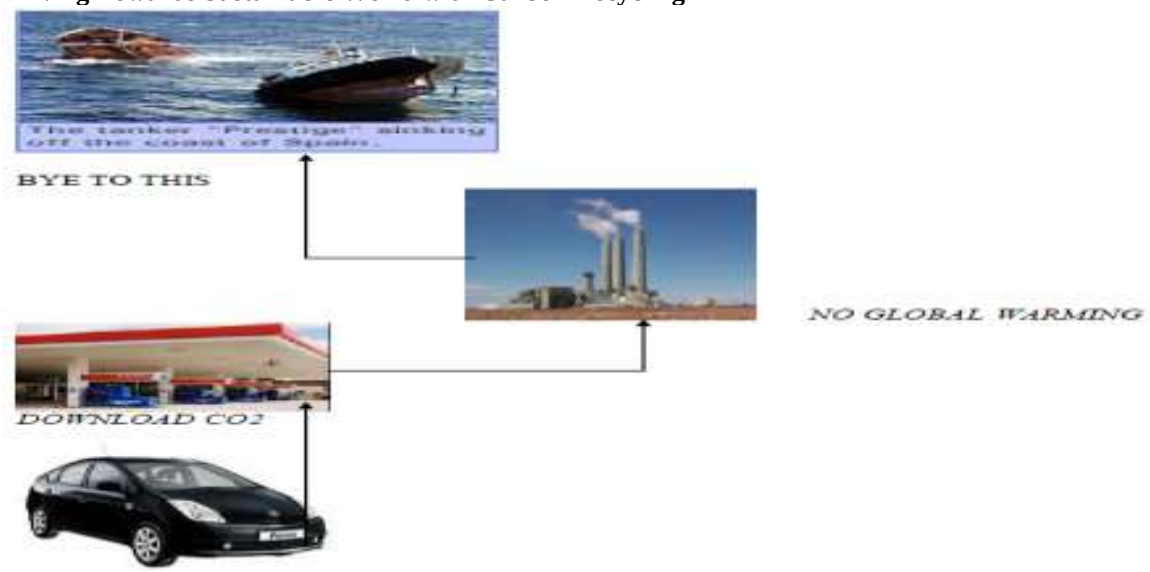



**Fig2. Schematic Diagram of Carbon Recycling**

A working recycling plant was constructed in 1996 using solar power as the energy input & CH4 as the HC energy vector. The production of methanol from CO2 &the subsequent conversion to petrol has been the subject of investigation & has been demonstrated in several studies.

**Driving Towards Sustainable World with Carbon Recycling**



## IV. CONCLUSION

This project relates to adaption to a conventional petrol fuelled vehicle such that:
Petrol is ignited & burned with O2 instead of air.
The O2 is fed in conjunction with recycling CO2 to control engine temperature.
CO2 is cooled/ compressed from the recycle & condensed to form a liquid at 70 bar. The nanoplatinum filters the harmful gas.
The liquid CO2 is stored on board in a pressured container.
O2 is supplied on demand from air by a miniature on-board cryogenic separator.

The on-board CO2 can be returned to the petrol station & discharged for local storage concurrently with refueling the petrol. This allows for perfect carbon recycling, thereby eliminating the requirement for fossil fuel use in transportation. The present study concludes that, while the ZEPV with the combination of nanotechnology concept is technically feasible, it may only become economically viable in an appropriate carbon-taxing framework. IT serves as a carbon source for converting back into petrol using appropriate catalytic reactor technology such as methanol to gasoline.

## REFERENCES

[1]. "NANOTECHNOLOGY and the next fifty years", by RICHARD.
[2]. NANOTECHNOLOGY, by RALPH MERKLE.
[3]. IEEE Magazine on Nanotechnology.
[4]. DREXLER, (1986) Text book of Engines of creation.