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Red Hydrocarbon









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Red Hydrocarbon – is a not-for-profit think tank







- Existing approaches are;
- logically flawed,
 - uneconomic,
 - \succ too slow and

In 20 years – They just haven't delivered!









But first, WHY Red Hydrocarbon?

- > All solutions to Climate Change are very expensive.
 - whether achieved by: PV arrays*, Wind generation, Nuclear (fission or fusion), Geothermal, CCS or any other means
- > Tax payers (and politicians) have showed that they will not pay
- So, investment must come from conventional sources.
- …and each individual *project* must generate a proper return.

This means that each individual project must be: **INVESTABLE**







What about the alternatives?

- *The* € costs of *PV* arrays, may be falling fast but still much higher than *HC* energy.
- •A simple calculation shows that **the land utilization for PV** to replace just the current electricity generation in UK would demand:
 - •- 13% of the area currently occupied by ALL UK motorways or

* Land based **wind generation requires even more** land area, is more expensive overall (and wind does not always blow)

*Off-shore based wind generation requires the same footprint albeit in the sea but is much more expensive again







The size of the task:

- The world's current power sector alone) comprises c. 10,000 major power plants (emitting just c.17% of CO₂ world emissions).
- ➤ To modify or replace these @ €2 4bn each = c.€30tn

This does not address:

- > The projected growth in the energy market.
- > Nor the current **+ 83% non electric energy demand**.

Summarizing this as a cartoon.....

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HOW ARE WE DOING SO FAR?....

c.**€30tn**

100% WORLD CO2 EMISSIONS

NOT TERRIBLY WELL....







WHY Red Hydrocarbon?

Over the past 20 years, the complexity of trying to:

identify,

measure and

directly manage;

 CO_2 emissions worldwide has so far defeated us.

We need to pull a different and more controllable leaver.







CO2 sources – control options? BUT SHOULD CONTROL BE HERE? the ball of LUMBER NATUAL GAS OIL COAL Hydrocarbons (HCs) CONTROL IS CURRENTLY HERE SHIPPING ELECTRICAL AIRCRAFT CHEMICALS & IRON & STEEL MOTOR REFINERIES POWER TRAFFIC PLUS SPACE HEATING CO_2 20.6 MANY MORE **CO2 FROM ENERGY DERIVED FROM HYDROCARBONS**



The amount of carbon (atoms) in anthropogenic CO2 is exactly the same as the number of carbon atom in the HC burned to produce it.

Direct control of HC production is less complicated, with fewer entities to be managed and better, more reliable & available data. So,....

The Red Hydrocarbon proces*s* is based on using *HC production* as the CONTROL lever.

 $\ensuremath{\mathbb C}$ Dr Rex Gaisford CBE, Red Hydrocarbon NFP





CRITICAL AIMS of RED HYDROCARBON

- 1. Reduce world CO2 emissions to *zero/tolerable*
- 2. Within an *acceptable time* frame
- 3. On a practical, *long term & sust*ainable basis
- 4. Relying on *commercially available capital* investment
- 5. In a *market driven* system, independent of the public purse
- 6. *Absent* competitive/discriminatory, taxes and public subsidies
- 7. Delivering *energy prices that people can accept*





METHODOLOGY

Red Hydrocarbon removes all meddling with the markets, so:

- No taxes, no subsidies.
- \succ The best energy solutions win.
- CO2 decline is assured.
- Climate change doesn't happen.
- The most cost effective energy sources to meet the demand govern the price
- ➢ Governments of whatever hue are off the pitch.
- Capital becomes available on a strictly commercial basis and
- The existing owners of capital can freely deploy it to produce profitable Cfree energy.

SO HOW DO WE GO ABOUT IT?







TWO UNDERLYING PRINCIPLES

1. Create a *Dual Market Scheme* for all hydrocarbons (*HC*) where:

Each *HC* market is characterised by the *END-USE* of its *HC*.

• *1 - Black HC* :where its end use gives rise to CO₂ emissions

and

 2 - Red HC :where its end use is carbon free ("Cfree")





TWO PRINCIPLES UNDERLIE Red Hydrocarbon

2. *Black HC* is gradually capped

This is done progressively over (c. 50 – 100 years) voluntarily or by edict, to *exactly* mirror the *Tolerable Carbon Trajectory* (TCT) envisaged by the IPCC.

The IPCC required carbon trajectory is therefore always achieved.

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HOW DOES IT WORK?

The basic mechanism is straightforward:

- The two HC markets work independently of each other as separate free markets *supply vs. demand*.
- They *interact commercially* with each other through their *downstream* markets; energy market, the steel market, the fertilizer market.....etc.



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THE OUTCOME

- > CO2 emissions reduced to a *planned and predictable decline trajectory*.
- > The *traded volume* of *Black HC* trends down but its scarcity drives *market* price up.
- > The *traded volume* of *Red HC* trends up as market demand increases.
- > All *HC produced* is available to serve both *Black* and *Red* market demand.
- > The total volume of *HC* produced/traded depends on this *overall demand*
- > Black & Red HC energy, compete ensuring price comparability.
- > *Red HC* market price will always therefore be lower than for *Black HC*
- Subsidies and special tax regimes no longer apply to either the *HC* or *energy* markets.

AND:

- > The markets alone rule the prices for *Black* & *Red HC and* for *energy*
- Governments are not involved in pricing *HC* or *energy*.
- > All types of **Cfree energy (**including **Red HC)** compete with one another.
- So, all types of **Cfree energy** (including **Red HC energy)** become **investible**.
- Commercial/ private investment alone support investment without state aid.
- HC industries mobilize their human and financial resources to become important investors in Red HC energy (R&D, design and build).







THE RED HYDROCARBON - MECHANISM

The basic mechanism of *Red Hydrocarbon* is straightforward. More detailed aspects now to explore some critical issues.

SOME KEY ASPECTS:



- 1. THE SIZE OF THE PROBLEM
- 2. INVESTMENT and INVESTABILITY
- 3. **RIGHTS to PRODUCE/IMPORT Black HC**
- 4. CERTIFICATES OF END USE & ACCREDITATION
- 5. START-UP ZONAL SCHEMES
- 6. DISPLACEMENT SCHEMES
- 7. OVERALL OUTCOME

Red Hydrocarbon is set out in more detail in a foundation paper available at: **www.redhydrocarbon.com**







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THE SIZE OF THE PROBLEM

- Which ever way it is achieved, *preventing climate change* is a very large endeavour.
- SOLVING this problem is possibly the largest and most concentrated non-military enterprise that the world has ever faced.
- It must be *accomplished* in a relatively short time (50 100) yrs.

This is a €50tn. > €150tn. endeavour

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THE SIZE OF THE PROBLEM

The price of energy affects everyone,so, it will be quickly absorbed within the world economy. (In exactly the same way that the oil shocks of the '70s were absorbed).





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INVESTABILITY

Any real solution to climate change has to be conventionally

INVESTABLE:

- It cannot rely on long-term subsidies
- It cannot rely on discretionary taxation
- It cannot rely on impositions at the whim of governments.

So, the costs of de-carbonization MUST be included in the *price of energy*.







INVESTABILITY

IN A NUT-SHELL:

The world needs long-term *investors* in Cfree energy.

With a new and better shape to the HC market, there can be one investor waiting in the wings

The *HC* industry.





VESTABIL	ITY
	HCs are the most concentratea conventional store of easily harvested inexpensive energy.
	"Free Burn" HC and release of CO ₂ has become unacceptable
	To eliminate this requires massive worldwide investment in energy supply alternatives to Free burn HC.
	The HC industries need markets for their product to survive and prosper
	The HC industries have very large resources:
	 ccapital resources, corporate expertise, human resources, intellectual property but declining opportunities for investment





INVESTABILITY

- The stability of the world economy depends on the continuing industrial health of its *major industries*.
- None is larger nor more important than the HC industry. So, the health of the world economy currently, depends upon a thriving HC industry.
- HC industry can only survive through a continuing market for HC.









INVESTABILITY

So, it is in the long-term interests of :



.....and the HC industry

.....for the *HC* industries to be amongst the principal investors in economically viable *Cfree <u>HC</u> energy* Site Navigation





INVESTABILITY

From this premise, a symbiotic cycle emerges as the world approaches the Post Carbon Age





Much more detail and interactive opportunity is available at: <u>www.redhydrocarbon.com</u>

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RIGHTS to PRODUCE/IMPORT Black HC

Annual rights/quotas hold the *key* to the whole *Red Hydrocarbon* approach.

Annual *rights/quotas* to produce or import *Black HC*, expire at year-end - "use it or loose it".





RIGHTS to PRODUCE/IMPORT Black HC - summary

Annual quotas to produce/import **Black HC** within the *tolerable carbon target* (TCT), are *auctioned* to **HC** producers or traders.

Annual quotas to produce/import apply:

- ➢ for one *specific year* (up to 20 years ahead)
- in *defined usage categories* (prioritised by absence of alternatives at future dates along the TCT) and....
- subsequently maybe partitioned and re-sold through secondary markets to to *HC* producers or to traders/resellers.



A cartoon shows how it works:







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RIGHTS to PRODUCE/IMPORT Black HC 2020 > 2030 > 2040 > 2050 >> Auction of annual 40.00 quotas 20.00 0.00 2020 2033 2046 2046 2059 Subsequently, Quotas maybe partitioned Traders **HC** Producers and re-sold through secondary markets to Quotas to *HC* producers or to for sale traders/resellers of HC





RIGHTS to PRODUCE/IMPORT Black HC - summary

HC can only be **eligible for sale** on the *Black HC* market from a *supplier* (producer or trader) holding an appropriate residual *annual quota*. *This being the Annual quota purchased less any ACTUAL Black HC previously sold in that year*.

















The last purchaser in the chain must be an accredited Cfree consumer.

≻This is another key aspect of Red Hydrocarbon







Important questions are:



- > Who can purchase *HC* on the *Red HC* market?
- An *accredited Cfree* user (e.g. a CCS electricity plant or a paint manufacturer).
- Who cannot do so because it or its customers will burn the *HC* and emit Co2?
- A "*Free Burn*" electricity plant or a refinery supplying an airline.

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- An accredited middle man can purchase *Red HC* if he gives an *undertaking* to sell it (in smaller parcels?) exclusively to accredited *Cfree* users or other accredited middle men and so on......
- At each transaction the purchaser provides the supplier with a *certificate of end use* showing it to be *Cfree*.

The last purchaser in the chain must be an accredited Cfree consumer.





- Once purchased as *Red HC* with the cost benefits arising from the lower priced *Red HC* market, it can not be made available to a *Black HC* end user or a middleman
- This naturally gives rise to the notion of an *accredited Cfree* plant/user.
- Which begets the need for an *agency* to confer the accreditation.
- This would be a natural role for existing *certifying authorities* (Lloyds DnV, ABS...etc.)





PROGRAM START-UP ZONAL SCHEMES

- A world-scale plan is unlikely to be realised immediately.
- ➢ In the short term, a large economic block could lead.
- Any economic block could be the "first mover"
- This would not disturb its *internal* cohesion (it could be an ideal policy for adoption by the EU or the US). (In which case, the importation of *HC* or of products with an *HC* "component" would be drawn into the process.)

Becoming "first mover" would encourage others to adopt *Red Hydrocarbon*

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PROGRAM START-UP ZONAL SCHEMES

- Other countries/economic blocks at differing stages of development could over time confidently adopt the *Red Hydrocarbon scheme*,
- Each on terms satisfactory to them, as they feel able to do so with rules, decline rates and other parameters suitable to their own circumstances.

These would be harmonized over time to meet the ultimate IPCC trajectory.









Today, there is no *Red HC* Today, all *HC* users buy from the same market.



BASIC POSITION





This changes with the introduction of *Red HC*



POWER PLANT INVESTS





Displacement Scheme - Type 1:

Red HC can be supplied to a an end user who continues to emit Co2 ("*free burn*") such as an airline. The "airline" invests (capex+opex) in a 3rd party facility to remove equivalent CO_2 . DS1. AERO OPERATOR INVESTS







Displacement Scheme - Type 1: (cont):

The 3rd party facility physically removes or sequesters the CO₂ but can't itself purchase *Red HC* The airline can buy *Red HC* and this could be marketed as *Red Aero* with marketing gains and cheaper feedstock for its airline operation

DS1. AERO OPERATOR INVESTS







Displacement Scheme Type2:

Similar to existing green energy schemes.

Here, a motor fuel retailer could sell *Red petrol* or a gas supplier could sell *Red gas* at a premium price to domestic customers.

The premium could finance the *Cfree* removal process investment at the 3rd party facility.

DS2. DOWNSTREAM FUEL RETAILER INVESTS







Displacement Scheme Type2: (cont.):

The actual capture plant;

- will not be able to buy *Red HC* to fuel its own operation
- ➢ its own output will not be classed a *Red HC*.
- The electricity generated will be less competitive.

The total CO_2 captured applies to only 50% of the total burned in both operations.

NOTE: It could be better, c.100% if the primary plant manufactures Cfree aero fuel (Hydrogen?!) rather than electricity so that the airline itself produces zero emissions. BUT in all displacement schemes, *Red HC* purchased can only be used to fuel one of the facilities. So it's an enabler not a final solution.

DS2. DOWNSTREAM FUEL RETAILER INVESTS



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BUT it works:



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THE OVERALL OUTCOME - SUMMARY

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