Red Hydrocarbon

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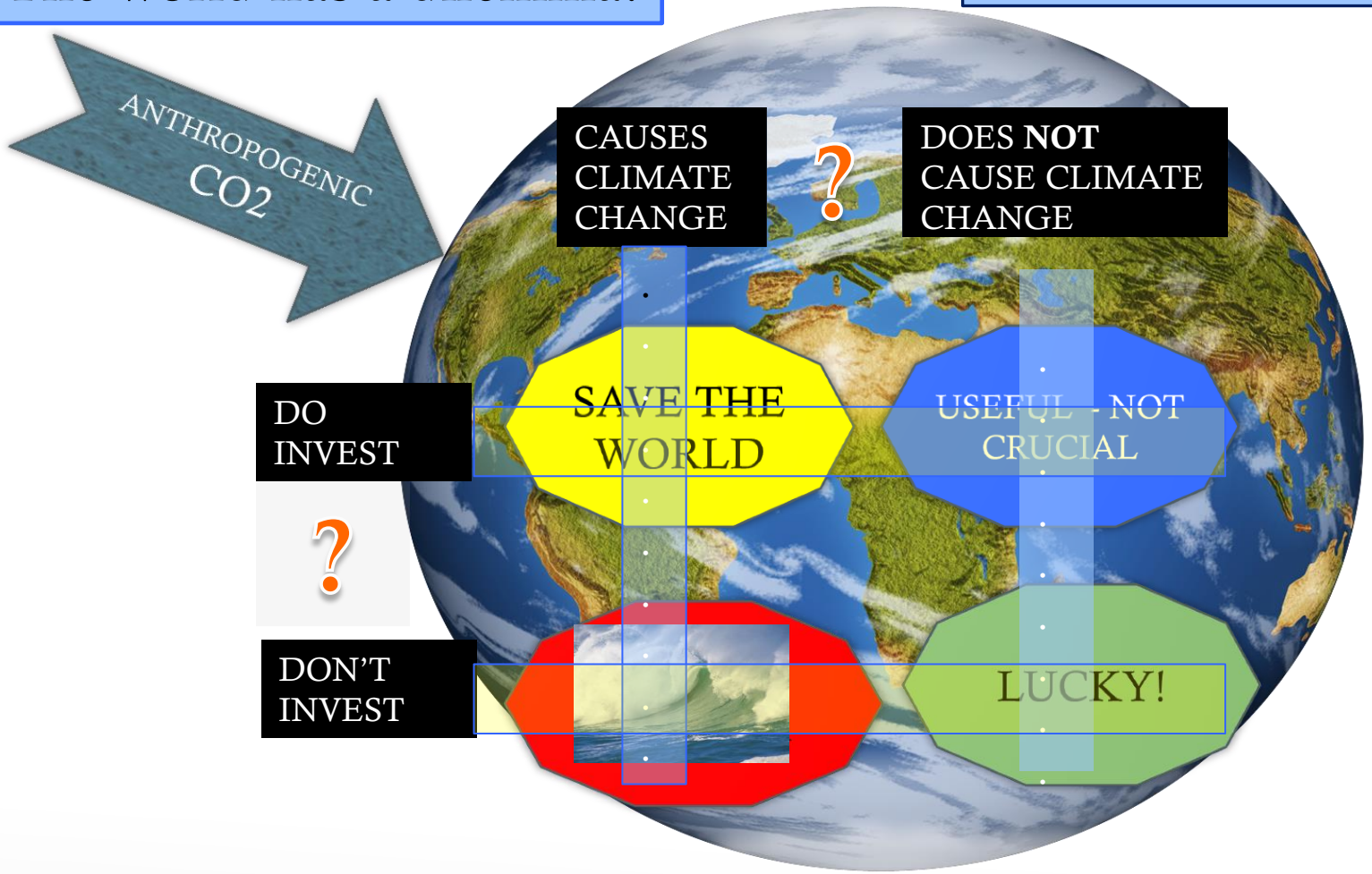
The world has a dilemma:

Look at the options:



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Can we really rely on LUCK ?

…… or, do we need a REAL solution to anthropogenic CO_2 > climate change?

YES! ……so the aim of the Red Hydrocarbon campaign is to pursue a practical solution.

The question to answer is ----HOW?

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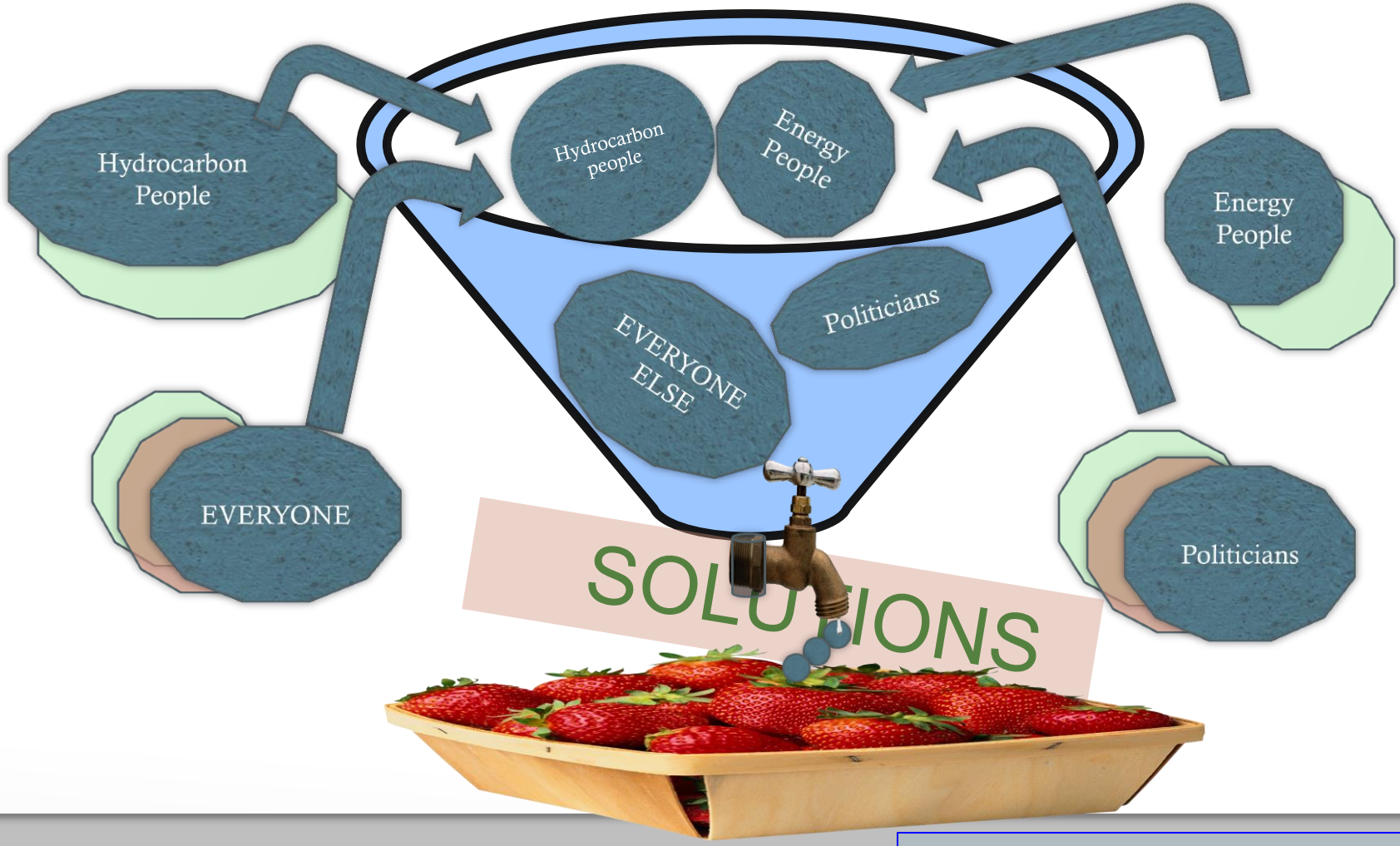
Red Hydrocarbon – is a not-for-profit think tank



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Red Hydrocarbon is a new and ***practical*** way to combat climate change.

- Existing approaches are;

- logically flawed,
  - uneconomic,
    - too slow – and……

In 20 years – They just haven't delivered!

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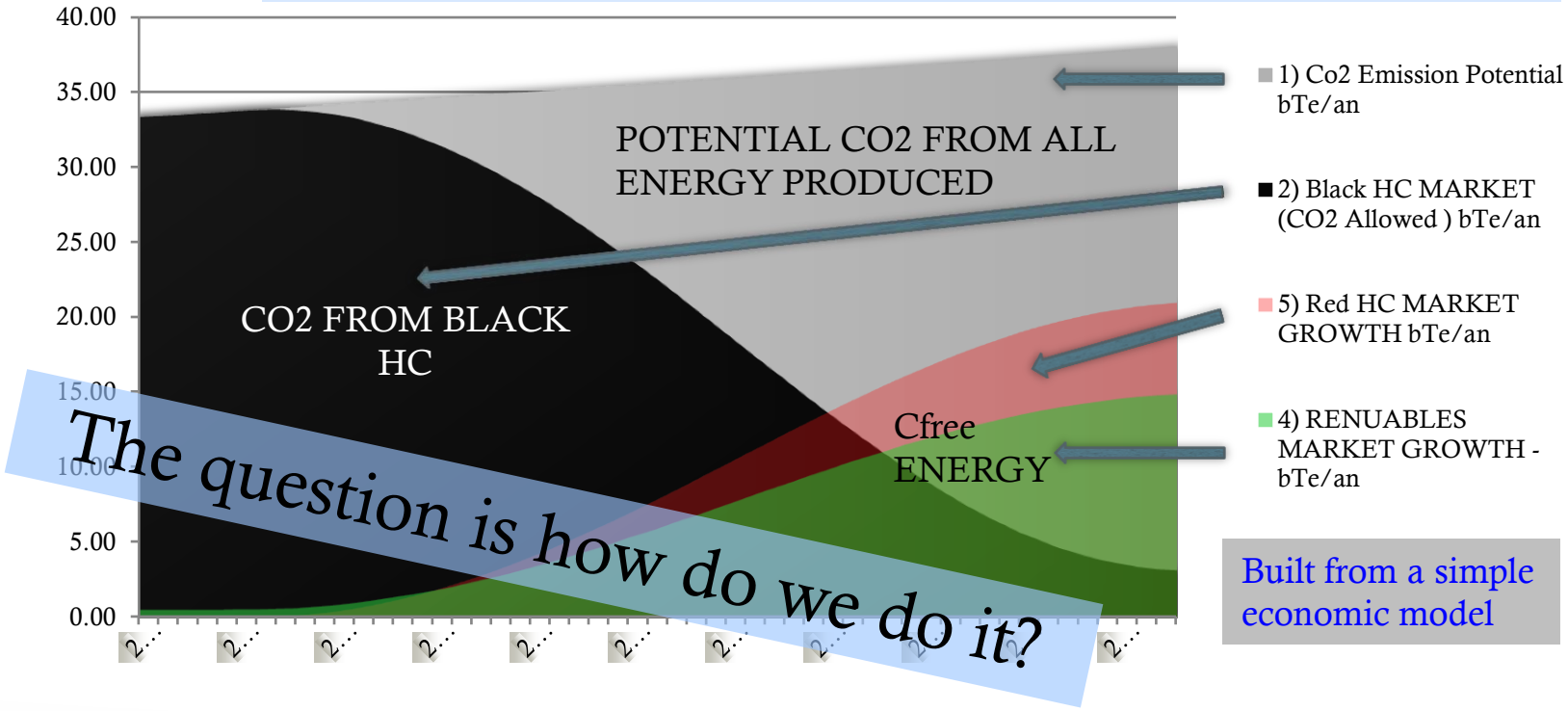
WE ACHIEVE A NEW OUTCOM BY CREATING TWO TYPES

OF HYDROCARBON – ***Black and Red.***

….. on the principle that….if Black goes down – Red goes up!



Built from a simple economic model

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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

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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***

** 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*

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The size of the task:

- The **world's current power sector alone**) comprises c. **10,000 major power plants** (and in the process, these emit just c.17% of world CO_2 emissions).
- To **modify or replace** these @ €2 - 4bn each = c.**€30tn**

And this does not even 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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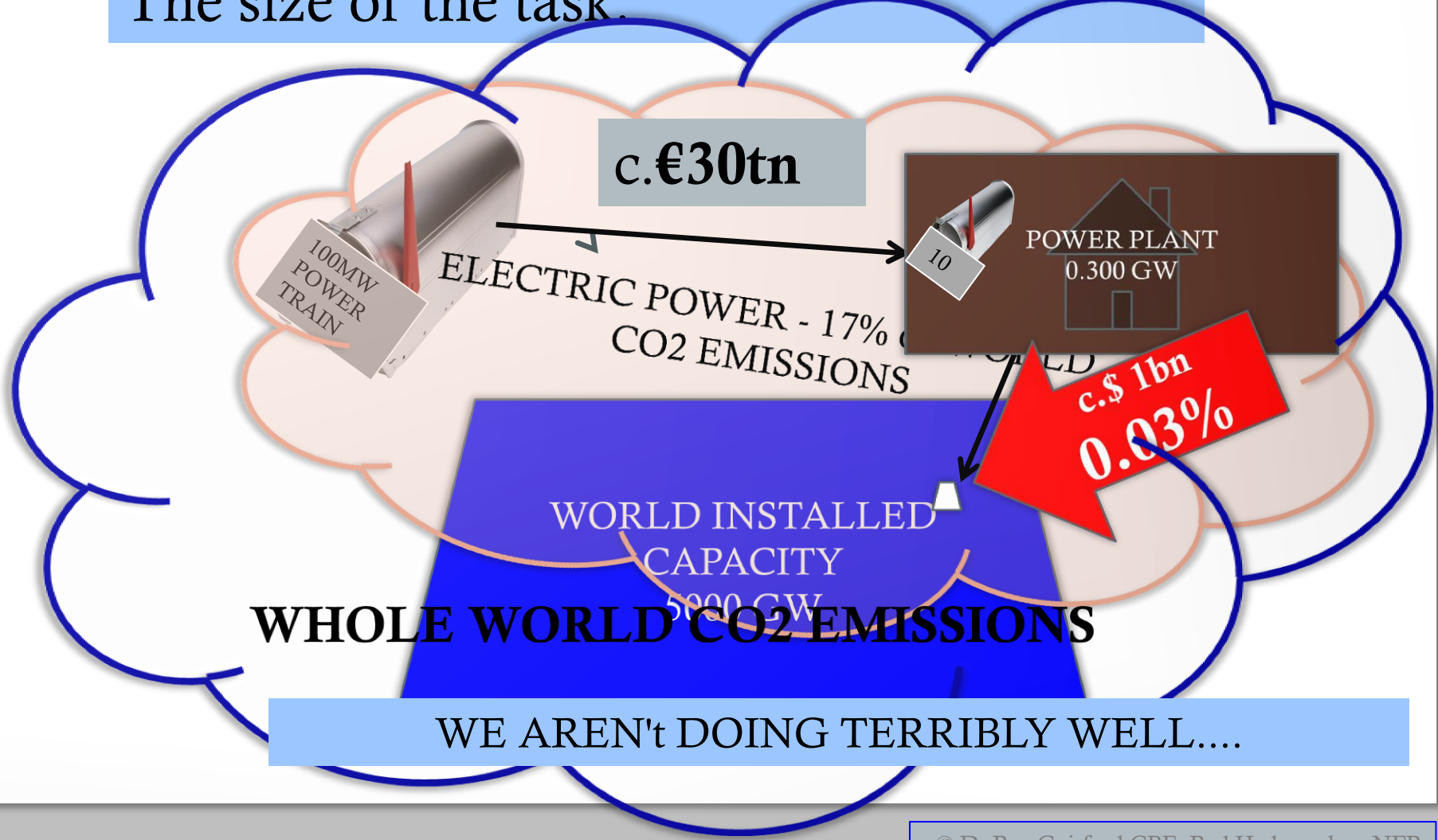
The size of the task:



WE AREN't DOING TERRIBLY WELL....

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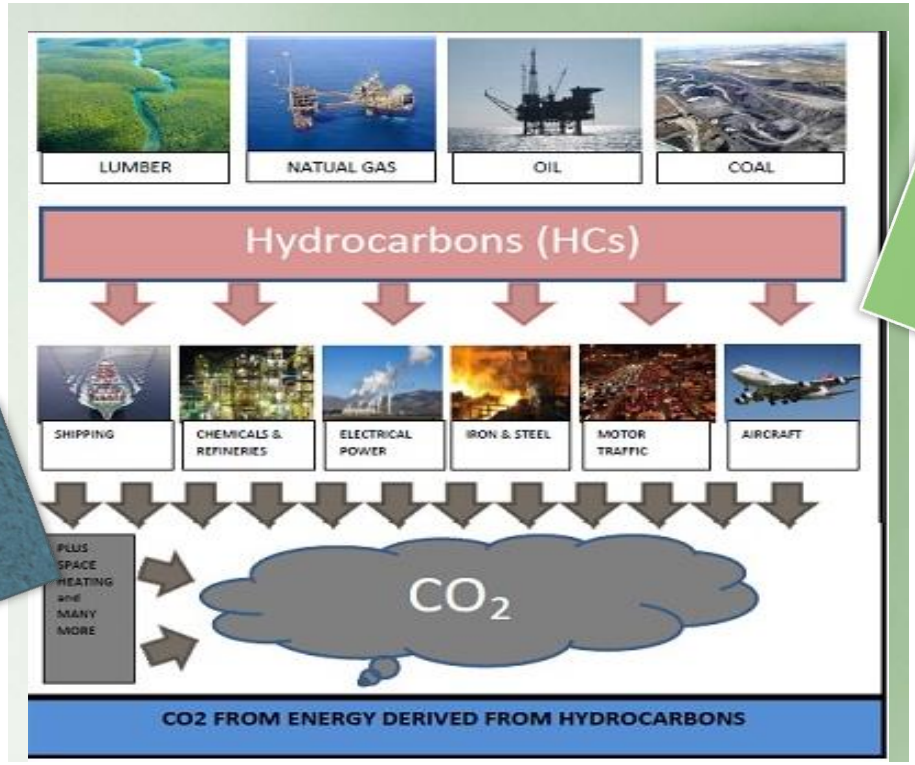
CO2 sources – control options?



CONTROL IS CURRENTLY HERE

BUT SHOULD CONTROL BE HERE ?

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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.

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As we all know, amount of carbon (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 than trying to control CO_2 emission

There are fewer entities to be managed and better, more reliable & available data. So,….

The Red Hydrocarbon process is based on using ***HC production*** as the lever of CONTROL.

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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***

THIS IS ACHIEVABLE

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METHODOLOGY

Red Hydrocarbon removes all meddling with the markets, so:

- No taxes, no subsidies.
- The best energy solutions win.
- CO_2 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 is made available on a strictly commercial basis and
- The existing owners of capital can deploy it without constraint to produce profitable ***Cfree*** energy.

SO HOW TO GO ABOUT IT >>>>>

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TWO UNDERLYING PRINCIPLES

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

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

- ***1 - Black HC*** :where its end use gives rise to CO_2 emissions

and

- ***2 - Red HC*** :where its end use does not – it has to be carbon free ***("Cfree")***

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TWO PRINCIPLES UNDERLIE Red Hydrocarbon

2. The ***Black HC*** market 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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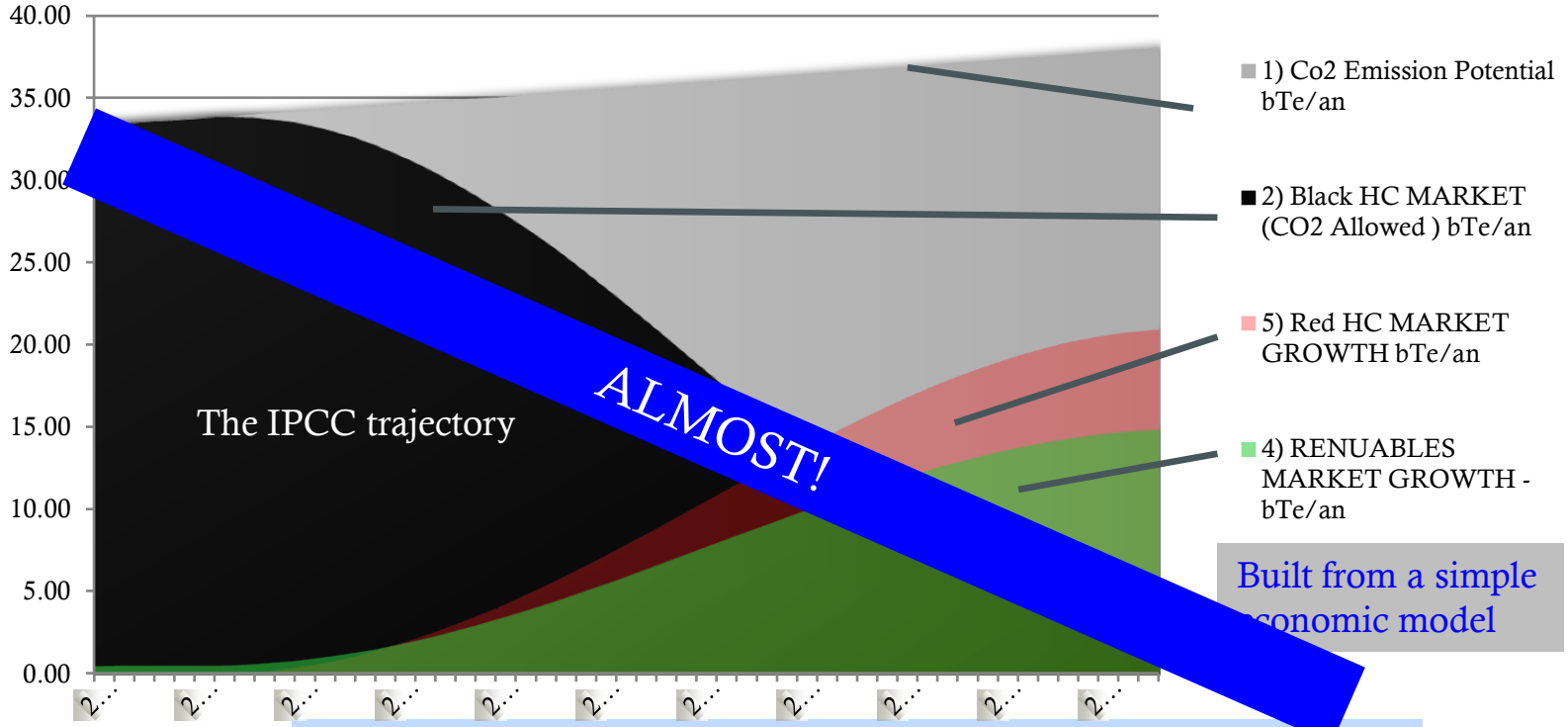
THE OUTCOME



In simple terms - **That's it!**

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HOW DOES ***Red Hydrocarbon*** 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).

TO ACHIEVE THIS WE NEED A MECHANISM >>>

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THE RED HYDROCARBON - MECHANISM

The ***Red Hydrocarbon mechanism described so far*** is straightforward.

However, there are some important 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**

and

8. **A BRIEF HISTORY OF DISAPPOINTMENT– Past problem**

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

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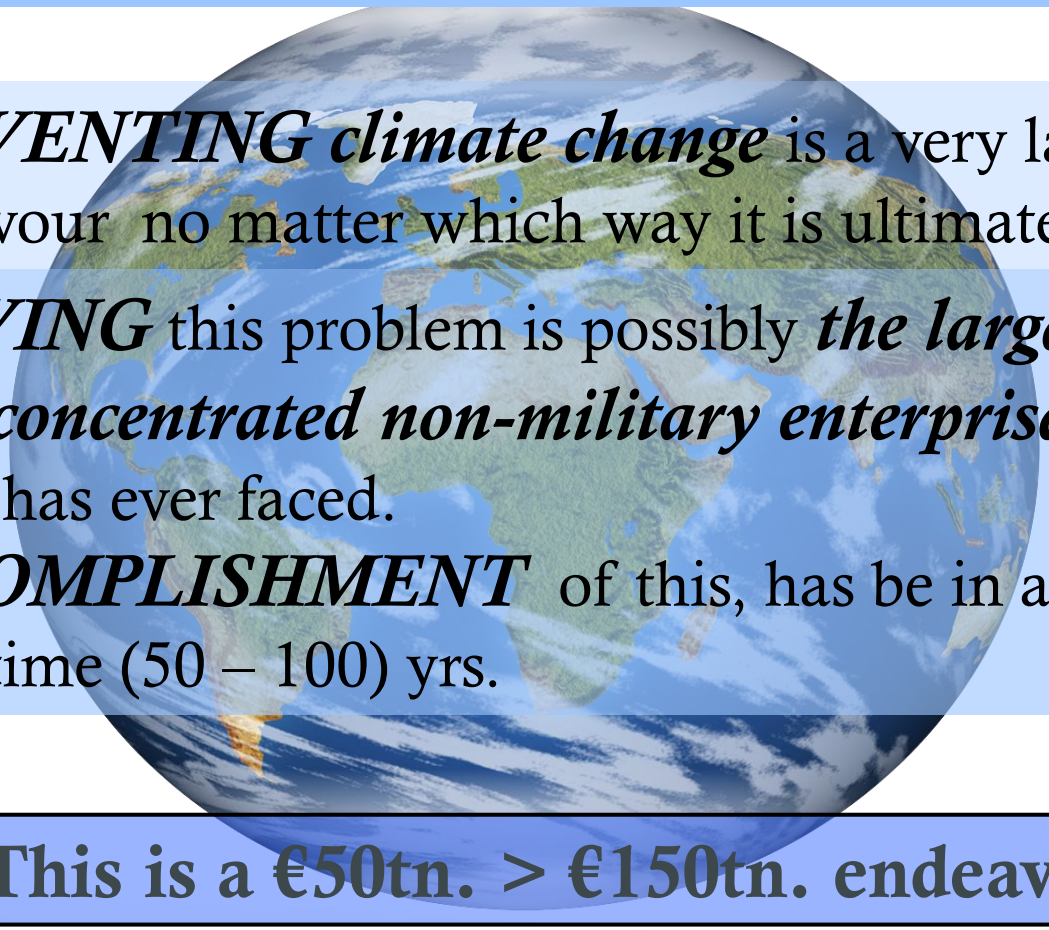
THE SIZE OF THE PROBLEM



- ***PREVENTING climate change*** is a very large endeavour no matter which way it is ultimately achieved.
- ***SOLVING*** this problem is possibly ***the largest and most concentrated non-military enterprise*** that the world has ever faced.
- ***ACCOMPLISHMENT*** of this, has be 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 HC** and therefor **the price of HC energy** affects the entire world,
. . .so, in exactly the same way that the oil price shocks of the '70s were absorbed.

A new ***world price*** for ***HC*** can be *quickly absorbed* across the world economy.

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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.***

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INVESTABILITY

Red Hydrocarbon 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.

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INVESTABILITY

***HCs** are the **most concentrated** 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**:*

- *capital resources,*
- *corporate expertise,*
- *human resources,*
- *intellectual property*
- ***but… declining opportunities for investment***

Careless destruction of the HC industries and their economic and technical resources would probably result in a world calamite

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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***.

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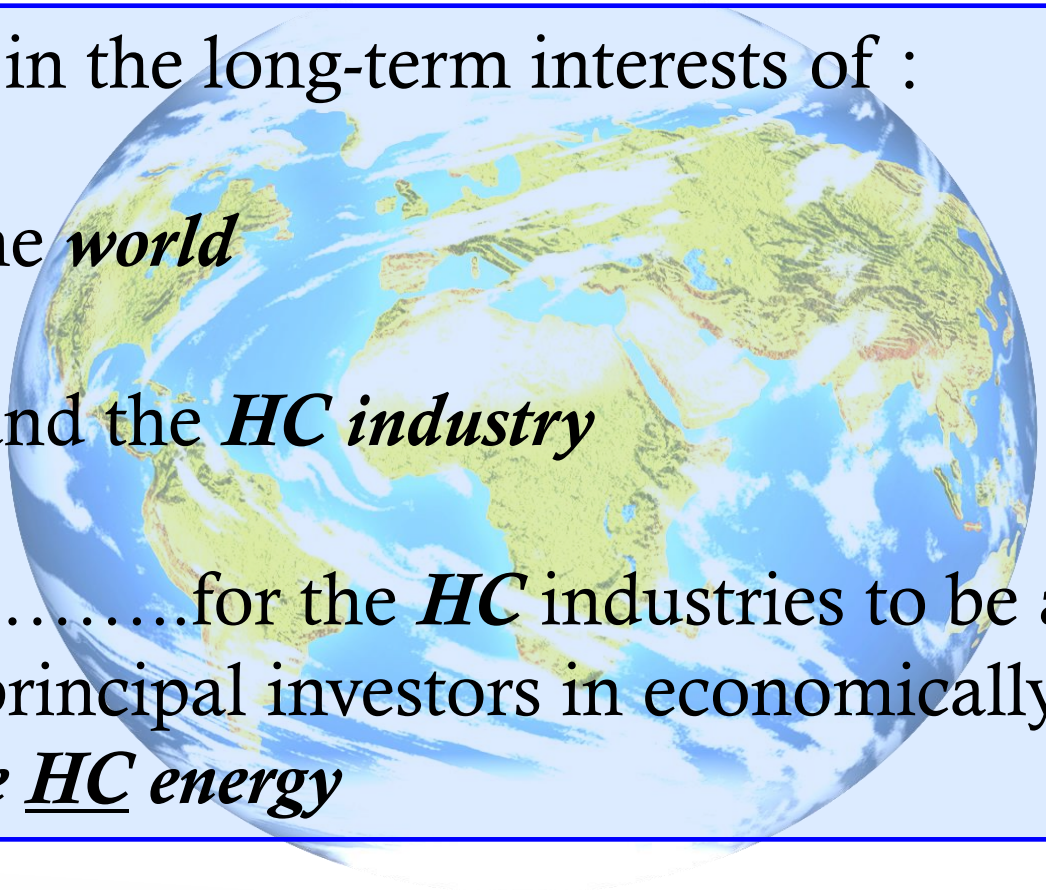
INVESTABILITY

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

- the ***world***

…..and the ***HC industry***

……for the ***HC*** industries to be amongst the principal investors in economically viable ***Cfree HC energy***



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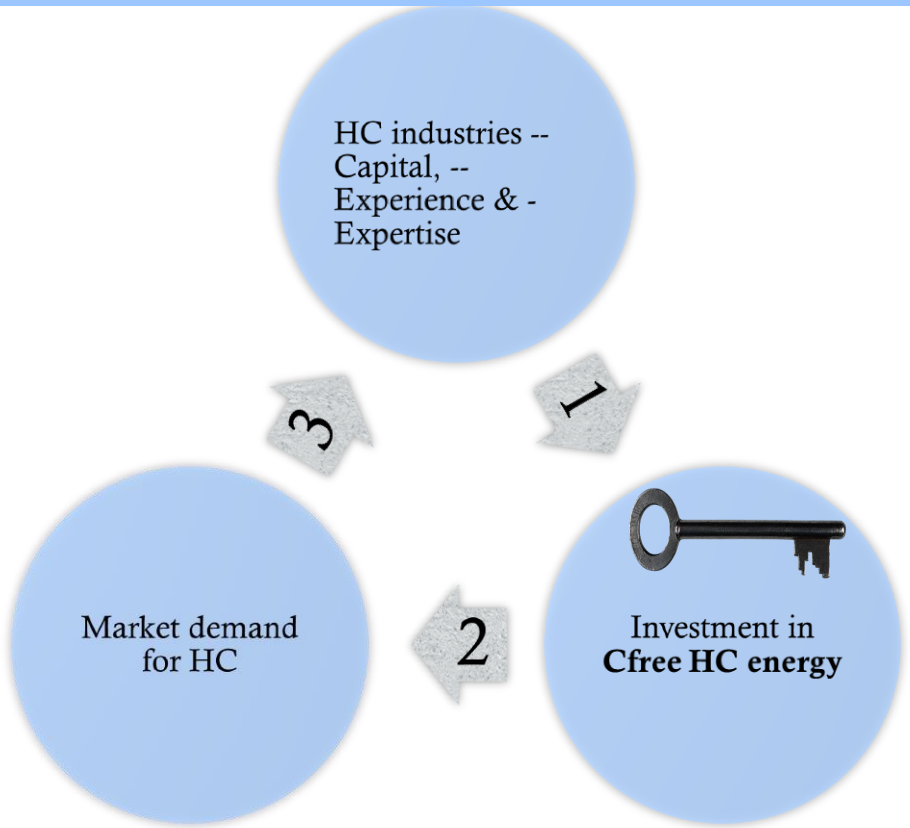
INVESTABILITY

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



Much more detail and interactive opportunity is available at:
www.redhydrocarbon.com

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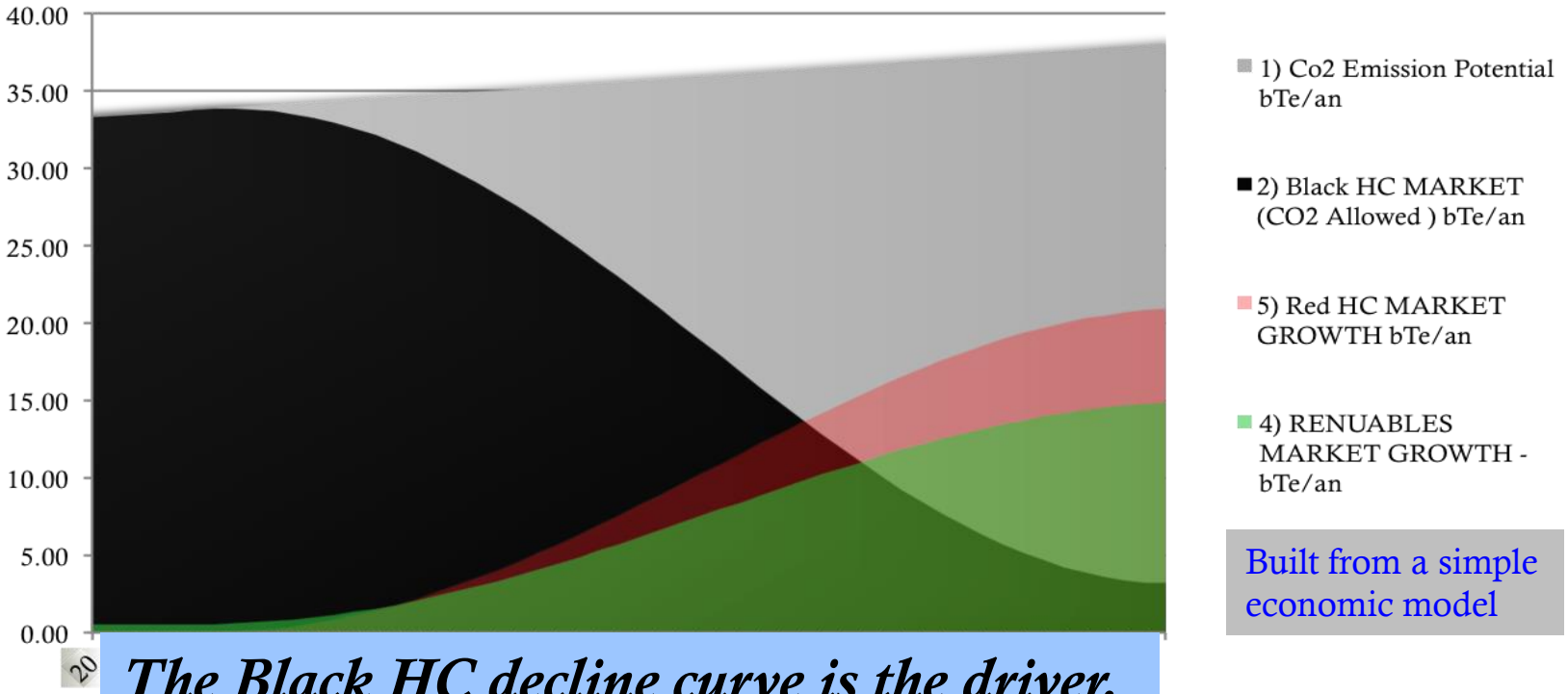
This **INVESTABILITY** cycle drives the program:



Built from a simple economic model

The Black HC decline curve is the driver.
The Cfree curves are the consequences

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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[1] ***Black HC ,*** expire at every year-end, It's - ***"use it or loose it".***

1.- or import if dealing in a a distinct economic block. (this will be covered later)

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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 can be purchased (or optioned):

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

A cartoon shows how it works:

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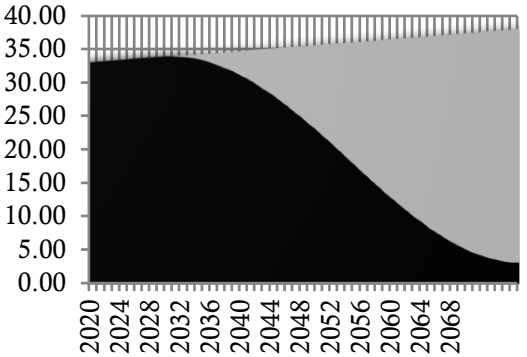
RIGHTS to PRODUCE/IMPORT Black HC

IPCC carbon Trajectory

2020 >2030>2040>2050>>



Annual quota CREATION

The actual downward trajectory of ***Black HC*** *will* therefore always be GUARANTEED to meet the Tolerable Carbon Trajectory (***TCT).***

annual quotas

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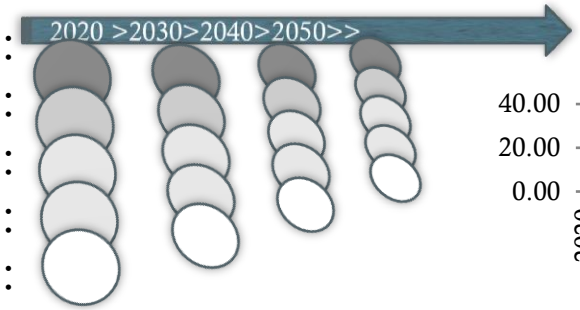
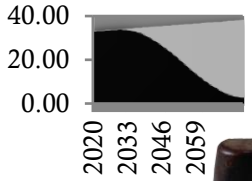
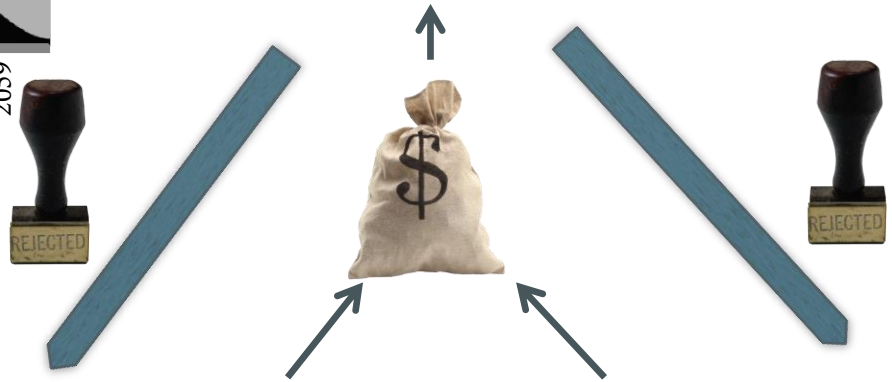
RIGHTS to PRODUCE/IMPORT Black HC





Auction of annual quotas



Quota Traders

HC Producers

Subsequently, ***Quotas*** maybe partitioned and re-sold through secondary markets to to ***HC*** producers or to traders/resellers

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RIGHTS to PRODUCE/IMPORT Black HC - summary

Physical 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 current Annual quota purchased less any ACTUAL Black HC previously sold under that quota in that year.

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RIGHTS to PRODUCE/IMPORT Black HC

End Users of HC may then fuel their business intentions, by purchase of ***Black HC*** on the ***Black HC*** market from a producer or trader ***within the level of these quotas***.

The OVERALL ***annual volume*** of RIGHTS to produce or import ***Black HC*** is defined by the ***Tolerable Carbon Trajectory*** (***TCT***) but:

- **Who initially owns these rights prior to first sale?**
  - **Who auctions them?**
    - **Who receives the money?**
      - **To what purpose should the money be put?**

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RIGHTS to PRODUCE/IMPORT Black HC

End Users of HC then fuel their business intentions, by purchase of ***Black HC*** on the Black HC market from a producer or trader ***within the level of these quotas***.

This is a big ticket question.
This is where the money is.

Could it be used for financing more Red HC Energy?

The ***annual volume*** of RIGHTS to produce or import ***Black HC*** is defined by the ***ToE*** but:

- **Who initially owns these rights prior to first sale?**
  - **Who auctions them?**
    - **Who receives the money?**
      - **To what purpose should the money be put?**

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CERTIFICATES OF END USE & ACCREDITATION

So whereas purchasing ***Black HC*** is constrained by quota and scarcity,
……the purchasing of ***Red HC*** is another key aspect of *Red Hydrocarbon*

*To be able to purchase **Red HC**, the **last purchaser** in the chain **must be an accredited Cfree consumer.***

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CERTIFICATES OF END USE & ACCREDITATION

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 refinery supplying an airline, or fertilizer manufacturer ……..

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CERTIFICATES OF END USE & ACCREDITATION

- 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.

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CERTIFICATES OF END USE & ACCREDITATION

- 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 he **can not** make it available to a ***Black HC*** end user
- If sold to a middleman
- This naturally gives rise to the notion of an ***accredited Cfree*** plant/user. This is KEY 
- It begets the need for an ***agency*** to confer the accreditation which would be a natural role for existing ***certifying authorities*** (Lloyds DnV, ABS…etc.)

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PROGRAM START-UP ZONAL SCHEMES

- An entire "world-scale" ***Red Hydrocarbon***"scheme will not 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 own *internal* cohesion (it could be an ideal policy for adoption by the EU or the US).

  (In this case, the importation of ***HC*** or of products with an ***HC*** "component" would become part of the process.)

A large economic block becoming "first mover" would encourage others to adopt ***Red Hydrocarbon***

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PROGRAM START-UP ZONAL SCHEMES

- Countries or whole 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 and eventually meet the ultimate IPCC trajectory.

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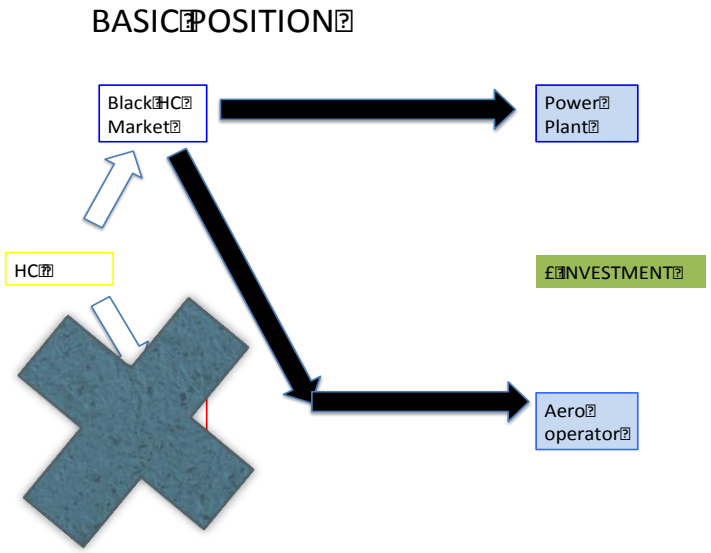
DISPLACEMENT SCHEMES

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



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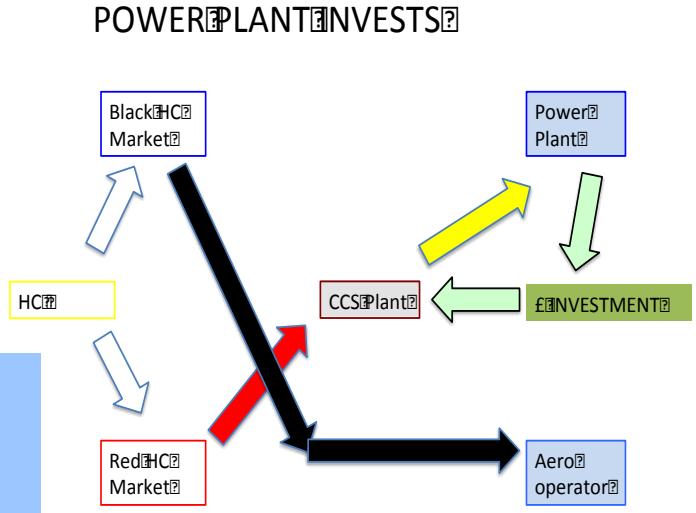
DISPLACEMENT SCHEMES

This changes with the introduction of:
Red Hydrocarbon selling to ***accredited*** end users.

…but ***Red Hydrocarbon*** also presents another opportunity: Displacement Schemes….



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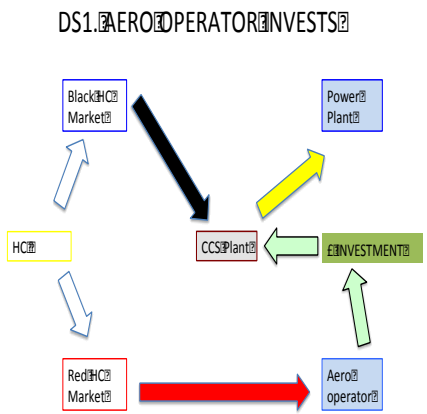
DISPLACEMENT SCHEMES

Displacement Scheme - Type 1:



Red HC can be supplied to a non-accredited 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.

The 3rd party facility physically removes or sequesters the CO_2 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

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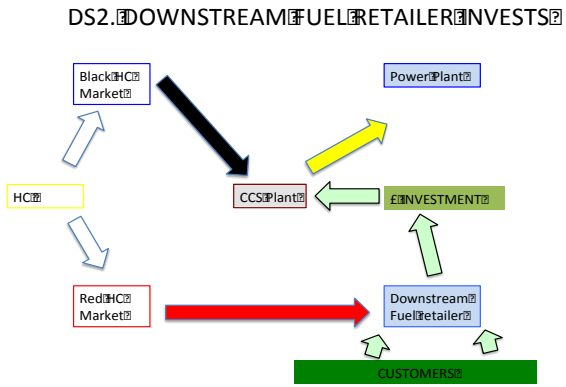
DISPLACEMENT SCHEMES

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*** remova process investment at 3rd party facility.



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 is only 50% of the total burned in both operations.

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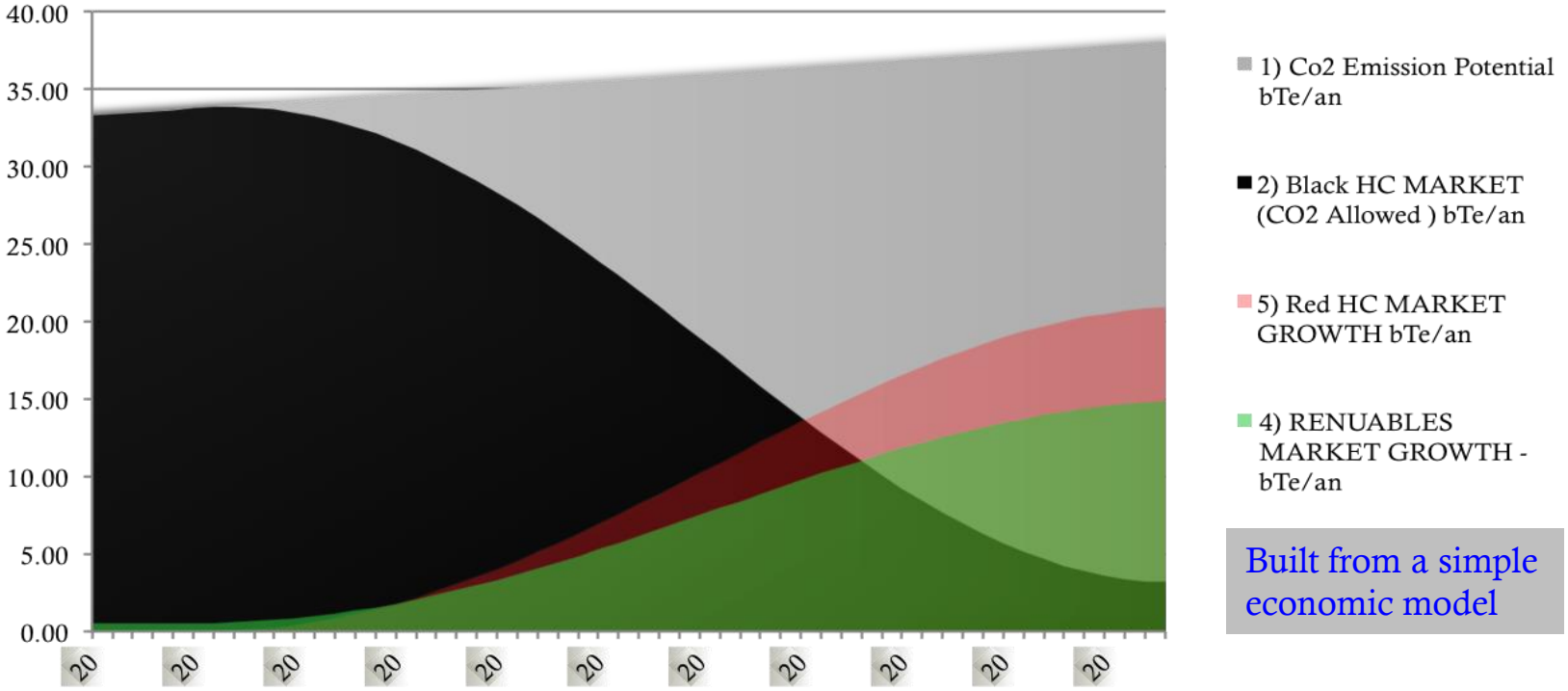
In overall terms Red Hydrocarbon still works:



Built from a simple economic model

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- CO2 emissions reduced to a ***planned and predictable decline trajectory***.
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- ***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).

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The Red Hydrocarbon story is set out in more detail in the foundation paper available at www.redhydrocarbon.com where everybody can interact with other followers of the site posting comments, suggestions and opinions.

END OF MAIN SEQUENCE

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A BRIEF HISTORY OF DISAPPOINTMENT

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A BRIEF HISTORY OF DISAPPOINTMENT

WHY HAVE EXISTING POLICIES REFUSED TO WORK?

Trying to meet our CRITICAL AIMS ▲ by ***directly regulating*** CO_2 emissions across the WORLD hasn't worked and it will not work.

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A BRIEF HISTORY OF DISAPPOINTMENT

Two different r…ve been attempted to directly control CO_2 emissions:

Cat. A: Subsi…gy: using direct subsidies to decrease Cfree energy costs…e with "free burn" HC energy. (e.g. CfDs),

Cat. B: Taxing or Charging… imposts, such as Carbon tax or ETS to **increase** t…C energy to allow ***Cfree*** energy to compete.

Both are doomed to continuing DISAPPOINTMENT.

- **Cat. A** methods have sometimes triggered inve…
- **Cat. B** methods singlehanded have yet to promoted a …e Cfree investment.

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A BRIEF HISTORY OF DISAPPOINTMENT

What we have tried so far – **Cat. A**:

For political/customer/consumer acceptance reasons, the baseline adopted for subsidised energy price competition has been as close as possible to the ***current cost of "free burn" HC.***

Direct price and/or capital subsidies have been the only methods so far that have achieved any investment – but at a large public cost.

……but ***"free burn" HC*** at any appreciable scale is doomed to eventual extinction within <100 yrs.

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A BRIEF HISTORY OF DISAPPOINTMENT

What we have tried so far – **Cat. A**:

So, if we continue on this basis, we will be left with the *frightful result of* low energy cost/price across the board

- subsidised on the basis of comparison with a non-existent historic competitor

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A BRIEF HISTORY OF DISAPPOINTMENT

What we have tried so far – **Cat. B**:

- **Carbon taxes & ETS schemes, BOTH** impose huge costs upon participating economies.
- Both are attached **at the whim of governments,**
- This economic "hit" occurs **many (c.10) years before** the very first reduction in CO_2 could be expected from ***any*** resulting investment into ***Cfree*** competition.

- **ETS schemes are in addition,** logically flawed. They can't work for a number of other fundamental reasons:
  - the market is flawed &
  - the market is flooded

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A BRIEF HISTORY OF DISAPPOINTMENT

What we have tried so far – **Cat. B**:

- Locally imposed carbon taxes & ETS schemes interfere with the normal working of the energy markets
- This deters the vital ingredient - - - - *investor* engagement
- This in turn, destroys ----- INVESTABILITY

So far, neither Carbon taxes nor ETS has single-handedly promoted a <u>single Cfree investment - WHY?….</u>

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A BRIEF HISTORY OF DISAPPOINTMENT

1: Applying to both Carbon tax & ETS

By penalising ***HC energy price*** either through a carbon tax or ETS being applied to ***HC energy***, the competitive imbalance with ***Cfree* energy** can be removed and in certain circumstances could provoke **INVESTMENT** - ***BUT only:***

- If the selling price of ***HC energy*** (post-tax / post ETS permit levied), rises to the price of ***Cfree*** energy - the ***price tipping point***

and

- If the ***price tipping point*** is somehow ***guaranteed*** to be maintained at that level until the investment has matured

and

- If the selling price of ***HC energy*** is NOT based on governments controlling the volume of printed emission ***permission instruments*** (e.g. EUAs) entering the market.

Otherwise, this is not an investable proposition

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THE MANAGEMENT OF CHANGE – Past problems

1: Applying to both Carbon tax & ETS

In both cases, the WORLD would also be paying the price in energy bills as soon as the ***tipping point price*** has been reached i.e. before any investment is operational or environmental benefit is achieved.

This would be approximately:

- **Some 10 years** before the **first emission reduction investment triggered by this policy** is on stream

  and

- **35 – 100 years** before **all emission reduction investment triggered by this policy** is on stream

It is "pay first – collect later" – MUCH LATER

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A BRIEF HISTORY OF DISAPPOINTMENT

1: Applying to both Carbon tax & ETS

Both ***Carbon tax & ETS*** would be very inefficient economic undertakings.

The economic cost over time (NPV_{10}) to the public purse of either scheme is **c. 20 times** the cost of subsidising individual investments as they happen.

It is very much more economically effective, to attract commercial capital to invest in ***Cfree*** energy directly in lock-step with the ***capital and production spend*** with no cost to the public purse.

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A BRIEF HISTORY OF DISAPPOINTMENT

2: An Emissions Trading Schemes (ETS)

As well as the problems of Carbon taxes, Emissions Trading Schemes (ETS) are ***actually worse.***

Over the last ten years

- ETS schemes, (such as the EU ETS) have never alone triggered a single *Cfree* project
- They are racking up government revenues and energy costs wherever they exist and finance

➢ The EUA market is illogical and cannot work.

We have an elephant – and it's still in our room!

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A BRIEF HISTORY OF DISAPPOINTMENT

2: Applying to just Emissions Trading Schemes (ETS)

- In a ***proper*** market (e.g. potatoes or grain) the market price is determined by tension between supply and demand.
- So if potatoes are in short supply the market price goes up and this moderates demand so that the price falls again until there is equilibrium.

NOT SO IN an ETS MARKET!!

Simple!

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A BRIEF HISTORY OF DISAPPOINTMENT

2: Applying to just Emissions Trading Schemes (ETS)

Looking at the *EUA* supply side:

- This is not a CARBON market
- This is not a CARBON EMISSIONS market
- It is a CARBON EMISSIONS PERMISSIONS market.

Where the ***carbon emissions permissions***, the ***EUAs*** are printed by government agencies.

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A BRIEF HISTORY OF DISAPPOINTMENT

2: Applying to just Emissions Trading Schemes (ETS)

Looking at the *EUA* supply side:

In this ***carbon emissions permissions market (EUAs)***.

- ***EUAs*** are in effect just tokens or currencies (and share some of the characteristics of currencies such as speculation and inflation/deflation).
- The number of ***EUAs*** available for sale is a result of government's policies.

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A BRIEF HISTORY OF DISAPPOINTMENT

2: Applying to just Emissions Trading Schemes (ETS)

……..on this *EUA* supply side:

- If governments allow the supply of ***EUA***s to be generous, their price will be low and there is ***no incentive*** for ***Cfree*** investment.
- If governments restrict the availability of ***EUA***s then the price will rise to the level, **the tipping point,** which incentivizes investment in ***Cfree*** **energy**.

Success! ……..?

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A BRIEF HISTORY OF DISAPPOINTMENT

2: Applying to just Emissions Trading Schemes (ETS)

Not really!!

Look again at the ***EUA* demand** side.

Each successful investment in replacement of HC energy with ***Cfree*** energy **reduces** demand for ***EUA***s.

This propels the price **lower**.

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A BRIEF HISTORY OF DISAPPOINTMENT

2: Applying to just Emissions Trading Schemes (ETS)

This is in the wrong direction!

- The incentive **declines** with each success.
- Investment potential for ***Cfree*** energy **dies** with every success.

ETS/ EUA or any Carbon Emissions Permissions (CEP) market is a dysfunctional market – it cannot work!

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END OF ADDITIONAL KEY ASPECTS

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THE RED HYDROCARBON - CONNETIONS

Critical Aims

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