

WHY IT IS NOT POSSIBLE FOR ANY of the NON-CONDENSABLE GREENHOUSE GASES TO HAVE AN APPRECIABLE AFFECT on WEATHER and CLIMATE CHANGE

28 Additional Weather Change Mechanisms that are NOT radiation-greenhouse gas interactions.

It is widely claimed that the **MAIN CAUSE of CLIMATE CHANGE** is due to '**GREENHOUSE GASES- RADIATION**'. **HERE IT IS SHOWN OTHERWISE!!**

Condensable water vapour, at a far higher concentration than ALL other greenhouse gases combined, is about twelve times more effective in radiation absorption. But water vapour does much more than just interact with radiation! It is the only gas that changes phase! This powerful mechanism dominates in many more effects in evaporation, humidification, condensation and precipitation processes; as well storms, gales, tornadoes and more.

In contrast, the non-condensable greenhouse gases {*carbon dioxide, methane, nitrous oxide*} are very low in concentration, very poor in radiation absorption/emission, and have virtually no effect on the 28 other heat transfer processes outlined here.

These 28 additional operating mechanisms show clearly why theoretical **mathematical models** are inaccurate have **failed** to predict future weather and climate.

1. EVAPORATION:

- (a) 71% of the Earth is ocean. Solar radiation directly impacts **LIQUID** water as oceans, lakes and rivers. 505 trillion tonnes of water evaporate/year (16 million tonnes/second). This is caused by direct liquid surface water-solar energy absorption **[NOT a greenhouse gas effect]**
- (b) Liquid water can evaporate without external solar radiation (evaporative cooling) **[NOT a greenhouse gas effect]**
- (c) Liquid water can evaporate into the atmosphere when there is NO temperature difference between the water layer and atmosphere (with or without solar radiation-water absorption) (reason: partial pressure lower than the vapour pressure) **[NOT a greenhouse gas effect]**
- (d) Liquid water can evaporate into the atmosphere in certain cases when the air near the interface is at a lower temperature (no external solar radiation needed) (partial pressure lower than the vapour pressure) **[NOT a greenhouse gas effect]**
- (e) Liquid water can evaporate into the atmosphere when the air *flowing* across the interface is not already saturated with water vapour (a concentration driving force: not a temperature driving force) **[NOT a greenhouse gas effect]**
- (f) Liquid water evaporation into the atmosphere can be augmented just by an increase in interfacial surface area: waves, winds, impacting raindrops and other flow disturbances **[NOT a greenhouse gas effect]**
- (g) Temperature gradients immediately below the liquid ocean surface can cause convective mixing to augment evaporation and thus the production of water vapour by means described above **[NOT a greenhouse gas effect]**

2. ATMOSPHERIC HUMIDIFICATION – WATER VAPOUR CHANGES

- (a) Water vapour can move in air (diffuse) without radiation due to pressure, humidity (concentration), and density differences (non-thermal driving forces) **[NOT a greenhouse gas effect]**
- (b) Water vapour concentrations in the atmosphere can change due to the interactions of adjacent moving air having a different level of moisture vapour content (humidity). Examples: gales, winds, thermals **[NOT a greenhouse gas effect]**
- (c) Water vapour concentrations can change in the air due to the local presence of water, water droplets, mists, rain, fogs, ice crystals etc **[NOT a greenhouse gas effect]**
- (d) Water vapour concentrations in the atmosphere can change when water vapour sublimates and goes directly to ice, ice crystals, or snowflakes **[NOT a greenhouse gas effect]**
- (e) Water vapour concentrations can change in the air when the water vapour-liquid water equilibrium (dew point) is exceeded **[NOT a greenhouse gas effect]**
- (f) Water vapour concentrations can change in the air when that moist air comes into contact with cooler solid surfaces e.g. dew **[NOT a greenhouse gas effect]**

3. CONDENSATION in the ATMOSPHERE

- (a) Gaseous water vapour and/or existing liquid water molecules can combine to form small liquid droplets in clouds, mists or fogs **[NOT a greenhouse gas effect]**
- (b) When atmospheric water vapour condenses to form fogs, mists, or clouds (phase changes) it gives up large amounts of thermal energy as latent heat **[NOT a greenhouse gas effect]**
- (c) Liquid water in clouds, mists and fogs can evaporate back to again form water vapour (gas) if the air is not saturated **[NOT a greenhouse gas effect]**
- (d) Liquid water in clouds, mists and fogs can evaporate to form water vapour (gas) with or without a temperature change (concentration driving force) **[NOT a greenhouse gas effect]**
- (e) Gaseous water vapour can condense and amalgamate with either, other water vapour molecules and/or other liquid water molecules to grow clouds, mists or fogs **[NOT a greenhouse gas effect]**
- (f) Gaseous water vapour can transform straight to ice crystals or snow particles without going through the liquid phase (latent heat transfer) **[NOT a greenhouse gas effect]**

4. PRECIPITATION

- (a) Minuscule condensed water droplets can amalgamate to form larger, less buoyant water droplets and then fall by gravity as rain **[NOT a greenhouse gas effect]**
- (b) Water droplets can freeze and amalgamate to form larger, less buoyant ice and snow particles and precipitate to the planet's surface **[NOT a greenhouse gas effect]**
- (c) Large falling rain droplets can pass through a cold atmospheric layer and freeze to form ice crystals or snow particles **[NOT a greenhouse gas effect]**
- (d) Snow particles or ice crystals can melt and produce liquid cold rain by energy absorption **[NOT a greenhouse gas effect]**

- (e) Raining water droplets can vaporise to form water vapour either by thermal energy transfer and/or by mass transfer driving forces (unsaturated local atmosphere) {termed 'virga'; visible rainfall does not reach the ground} [**NOT a greenhouse gas effect**]
- (f) Falling ice and snow particles can, by sublimation, transfer directly to gaseous water vapour [**NOT a greenhouse gas effect**]

OTHER FACTORS

- Water vapour can increase or decrease in concentration without any temperature change, or even when the temperature is lowered. This not a widely understood phenomenon and does not require solar radiation and is therefore, **NOT a greenhouse effect**
- Massive convective mixing operations worldwide in rain, winds, gales, storms, hurricanes, tornadoes and more, must all be factored in. Either thermal driving forces caused by temperature difference OR mass transfer driving forces caused by concentration or humidity differences, can cause large weather-change effects: **NOT a greenhouse effect**
- It must also be pointed out that solar radiation can also DIRECTLY heat planet Earth and all solid materials on it, and 'excite' various molecules so that they re-radiate long-wave thermal energy (in addition to direct reflection of incoming solar radiation): **NOT a greenhouse effect**

Most importantly, it must be seen that there are not just temperature-gradient driving forces (heat transfer) but also concentration-humidity driving forces (mass transfer). This cuts right across false notion that water vapour concentration depends only on temperature rise which could be caused by other greenhouse gases. Even NASA misses this point, as the water / water vapour system is seen to be a passive non-positive feedback greenhouse gas system. In some cases, water vapour is wrongly excluded as an active and controlling greenhouse gas. In reality, it is by far the strongest.

It is scientifically inaccurate and dishonest to isolate "radiation - low concentration/non-condensable greenhouse GASES" without fully endorsing: {direct radiation - LIQUID water interactions}, {direct radiation – SOLID matter exchanges}, {radiation - water vapour excitations}, as well as all the other thermal and non-thermal humidity driving forces in winds, thermals, gales, rain, storms, hurricanes, tornadoes, Trade Winds, Jet streams, El Nino's, La Nina's, atmospheric pollution and incomplete combustion particulates. All are significant! The impacting effects of ocean currents, ocean conveyors, cloud dynamics and sun spot activity.

No wonder that simplified mathematical models fail to predict climate change.

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APPENDIX

SUMMARY of IMPORTANT TRUTHS and MISCONCEPTIONS ABOUT GREENHOUSE GASES and THE RADIATION MECHANISMS

INCOMING SOLAR RADIATION [0.2 to 3 μm]

1. Water Vapour: (0.5 to 4% atmospheric concentration) – 7 radiant energy absorption bands ... 5 strong. **FIVE** times more effective than carbon dioxide with solar radiation.

2. Carbon Dioxide: (0.04%) (0.038% natural: 0.002% man-made) – only 2 radiant energy absorption bands
3. Methane: (0.00018% atmospheric concentration) - 1 miniscule radiant energy absorption band
4. Nitrous Oxide: (0.00003% atmospheric concentration) – 1 miniscule radiant energy absorption band

OUTGOING RE-RADIATION FROM EARTH [3 to 70 μm]

1. Water Vapour: (0.5 to 4% atmospheric concentration) – radiant energy absorption bands cover 85% of the entire span. **TWELVE** times more effective than carbon dioxide with re-radiation back from Earth.
2. Carbon Dioxide: (0.04%; man-made 0.002% atmospheric concentration) – only 2 additional radiant energy absorption bands
3. Methane: (0.00018% atmospheric concentration) - 2 small radiant energy absorption bands
4. Nitrous Oxide: (0.00003% atmospheric concentration) – 2 small radiant energy absorption bands