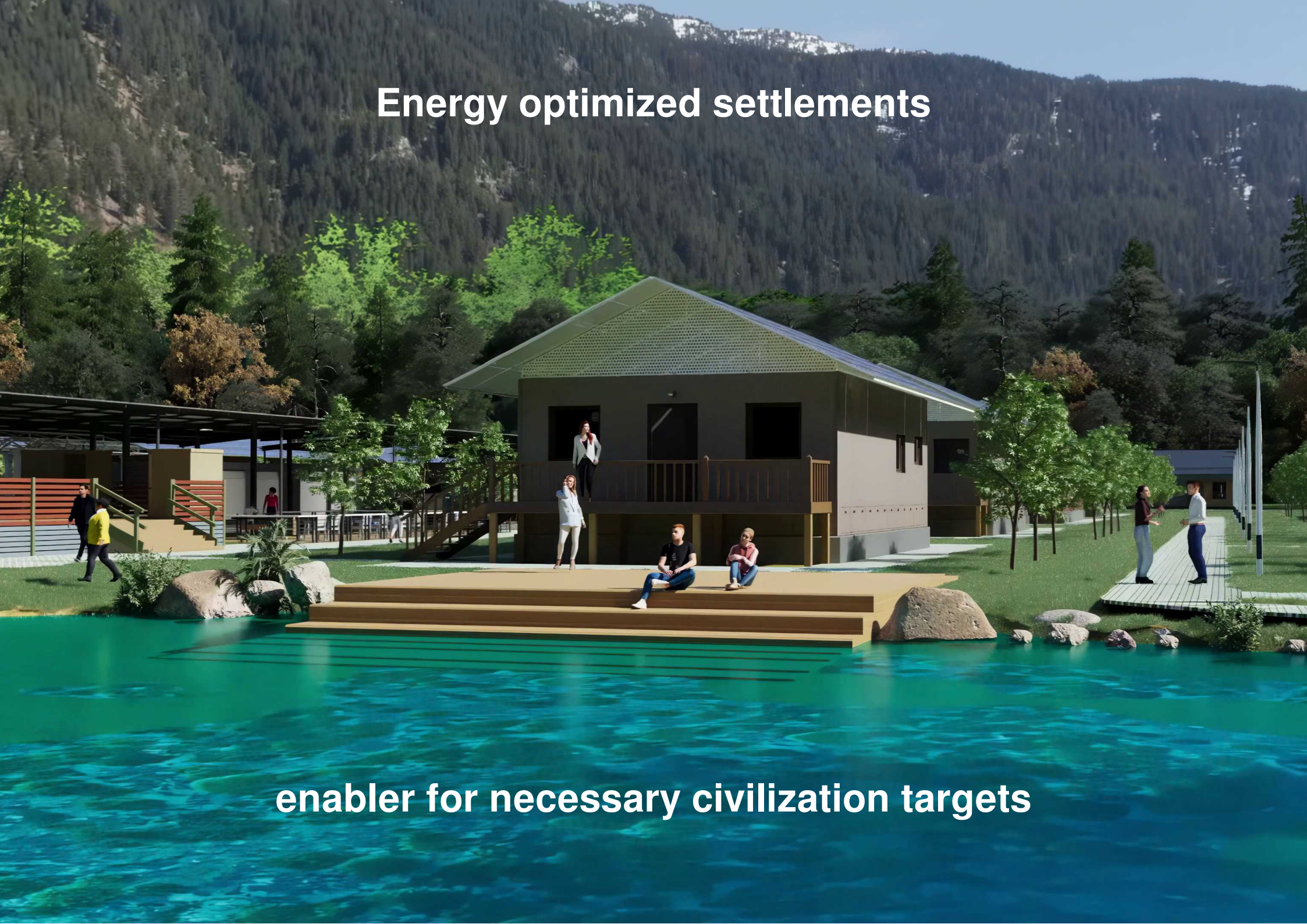

Energy optimized settlements
enabler for necessary civilization targets

What are necessary civilization targets?

Games theory:

Everything is abstracted as a playing field, players and rules of the game.

Question:

Why has the player brought intelligent life into the game?

Answer:

To maintain preserve protect life for a very long time.

Natural science:

Identify all the risks and long time problems for life.

Civilzation levels — civilization targets — civilization duties

1 Abstract

“Net-zero-emission and all will be good again” is scientific not holdable.

We need to target far beyond towards planet renovation back to 350 ppm CO2.

This requires worldwide wealth.

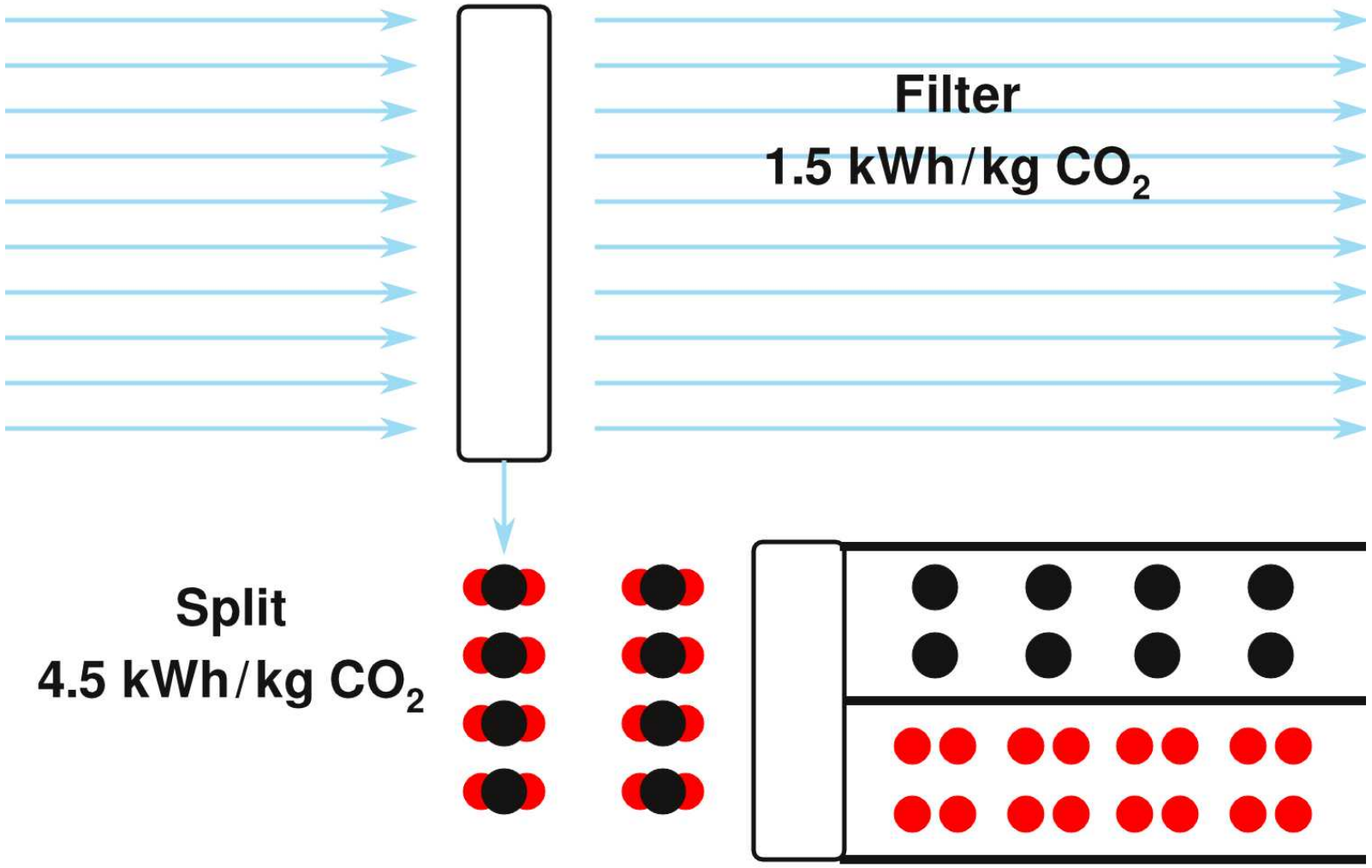
Worldwide wealth is only possible with great cost reductions for renewable energy and housing. Energy optimized settlements target this by synergy and cost optimized construction methods.

“Net-zero-emission and all will be good again”:

2021 changed the balance of the Amazonas to more GHG emission than absorption.

2023 absorbed the land nearly no CO2.

Time to reevaluate our strategies to deal with the climate change.



6 kWh / kg

1 ppm CO2 = 7,8 Gt

~ 47,000 TWh per ppm CO2

350 ppm CO2 is considered a stable climate situation, so we have to target reducing CO2 until we are back to 350 ppm CO2. We call this planet renovation. It requires about 47,000 TWh electricity to filter 1 ppm out of the atmosphere and split it into carbon and oxygen.

Reducing the CO2 level in the atmosphere is complete different from reducing CO2 emissions and requires complete different strategies.

The current strategy for reducing CO2 emissions is increasing energy prices, promoting reduce, restrict, renounce, stopping everything what could grow fast, holding great parts of humanity in poverty. This causes social unrest and strengthen the climate change deniers.

The planet renovation strategy requires cheap renewable energy and the whole mankind to contribute. This means worldwide wealth and is the opposite of the current strategy.

When 10 billion people contribute an average of 10,000 kWh/a we can reduce CO2 by 2 ppm per year. Hope that this is enough. GHG emissions from unfreezing permafrost could require even more.

The GEMINI next Generation house and the energy optimized settlements targets to make renewable energy and housing cheap enough to enable worldwide wealth and the planet renovation.

Keywords: climate change, planet renovation, 350 ppm CO2, cheap energy, worldwide wealth.

1 INTRODUCTION

The concept of using the same space twice for cost and land use reduction started 1991 with the project

“GEMINI inhabited solar power plant”.

The book

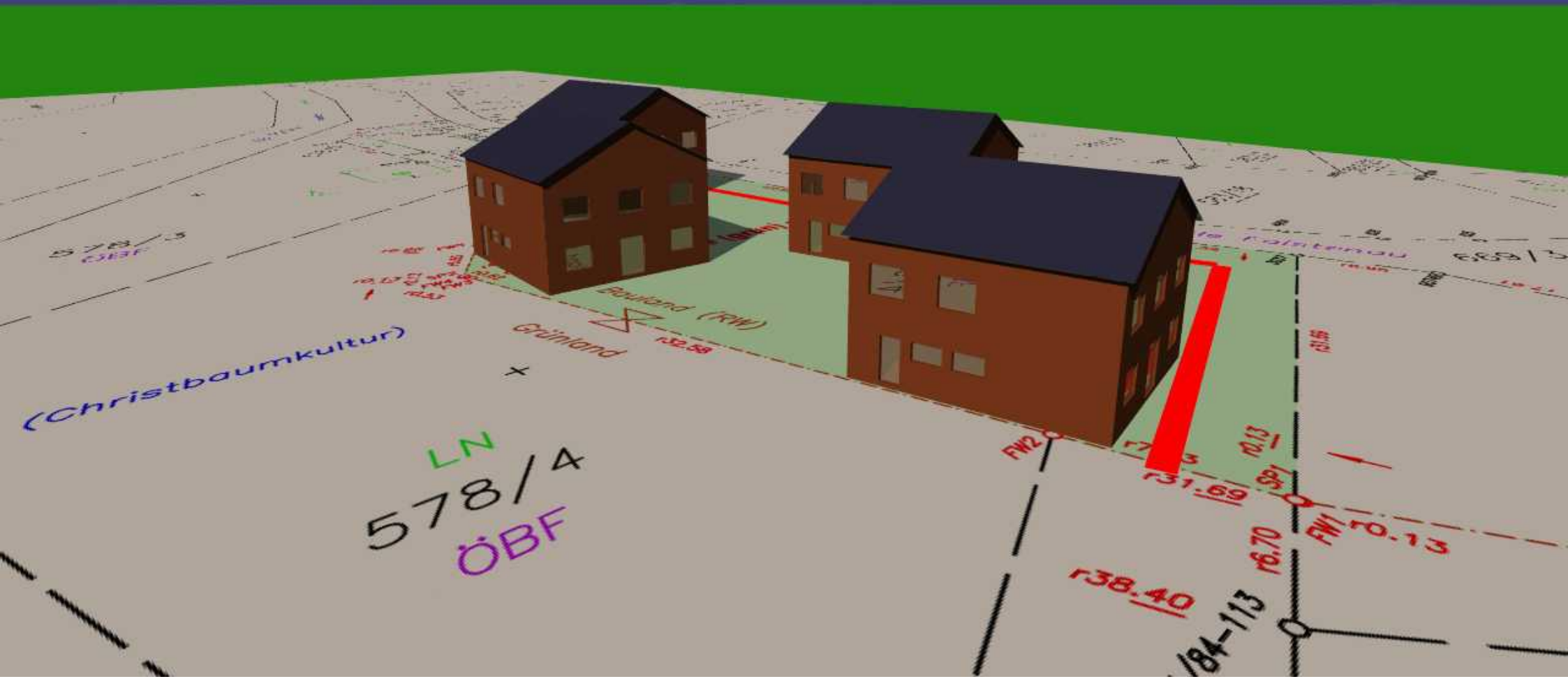
“Aufstieg zum Solarzeitaler”

(Advance to solar age)

published 1993 was about this project.

Only one “GEMINI inhabited solar power plant” was built in Weiz as the main attraction of the Styria country exhibition about energy in 2001. Unfortunately, the prototype was reduced from an annual yield of 30,000 kWh to just 8,500 kWh.

Somewhere between a conventional house and the GEMINI next Generation house, it brought much experience what should be avoided.



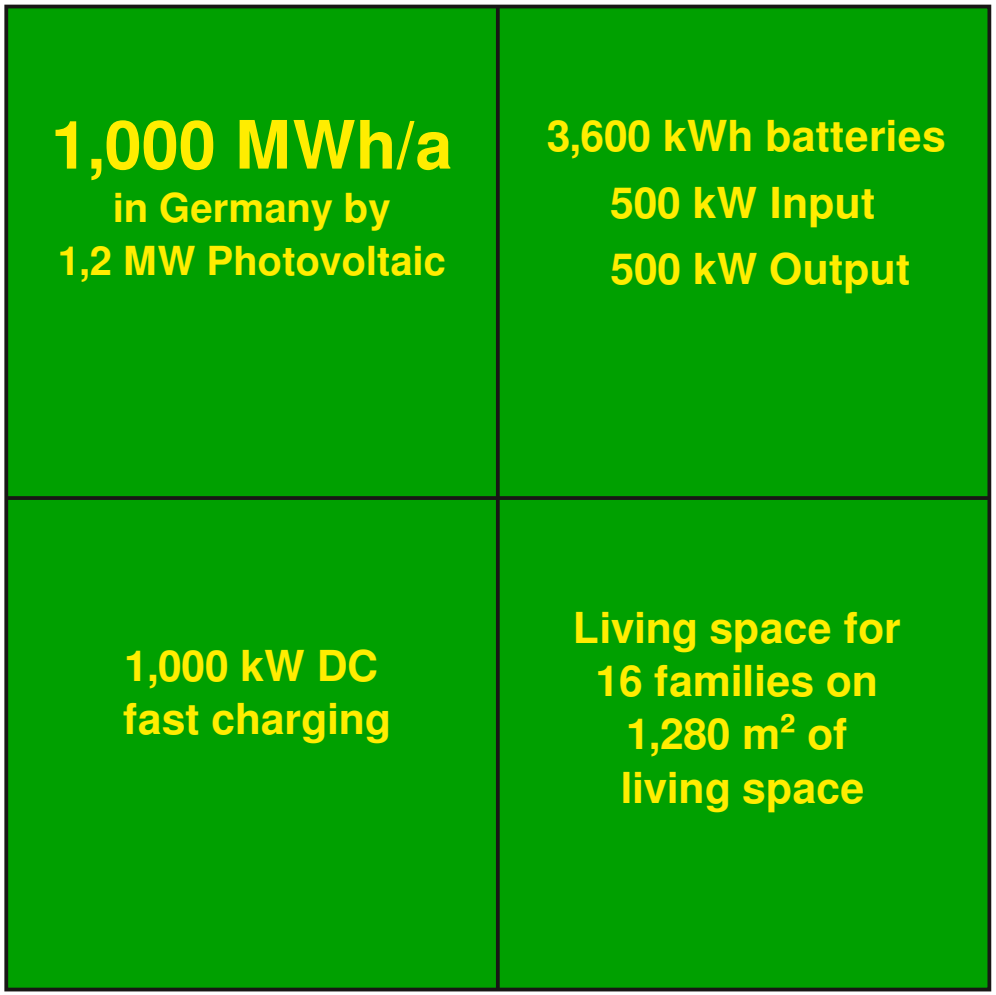
The project “cheap housing” 2018


evolved 2019 into the project “GEMINI next Generation”

2 Energy Transition by cheap housing

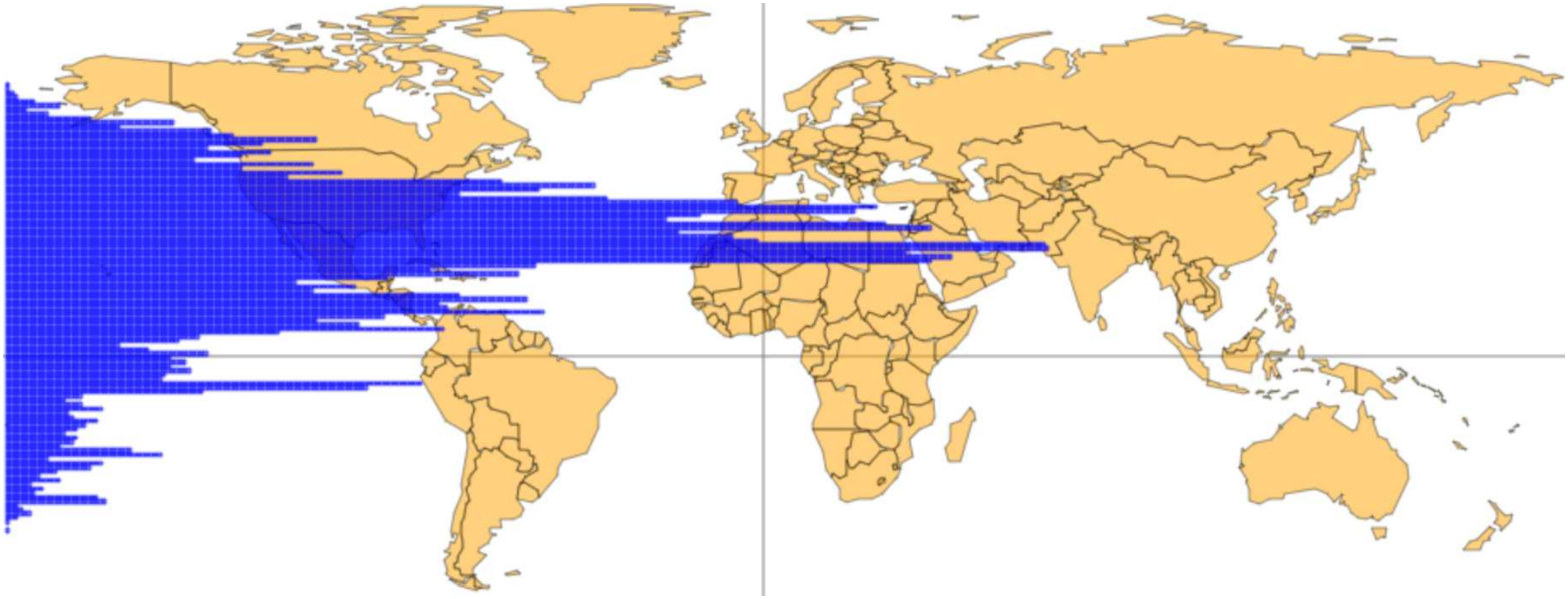
Everybody needs housing. So how to combine this existential necessity with as much energy production as possible? How much energy could a house produce? How much energy could a settlement produce?

A conventional settlement of one family houses could be about 14 per hectare. Even with 20 kW peak photovoltaic per house, only 280 kW peak.



An energy optimized settlement has 1,200 kW peak photovoltaic per hectare, more than 4-times more than a conventional settlement.

In addition to all the photovoltaic, only central power to methane systems, underground gas storage and CCPP are necessary. Germany already has 25 km^3 underground gas storage.



For luck, most of the world population lives closer to the equator and needs far less summer/winter balancing than Germany.

Europe is here an exception caused by the Gulf-Stream.

3 Land for Energy

There are countries with extreme high prices for building ground. There is this building ground for 1,000 €/m² unaffordable and some meters away is this photovoltaic in the field. People question, why here 1,000 €/m² and there only 10 €/m².

This can and will cause social unrest. Also, the cost of the energy transition. Renewable energy is cheaper than fossil energy, only problem to have to pay it for the next 20 years upfront.

A solution can be, that the government purchases green land and changes it to building land, but only to lease, and the lease price has to be paid in electricity feed in according to demand into the grid.

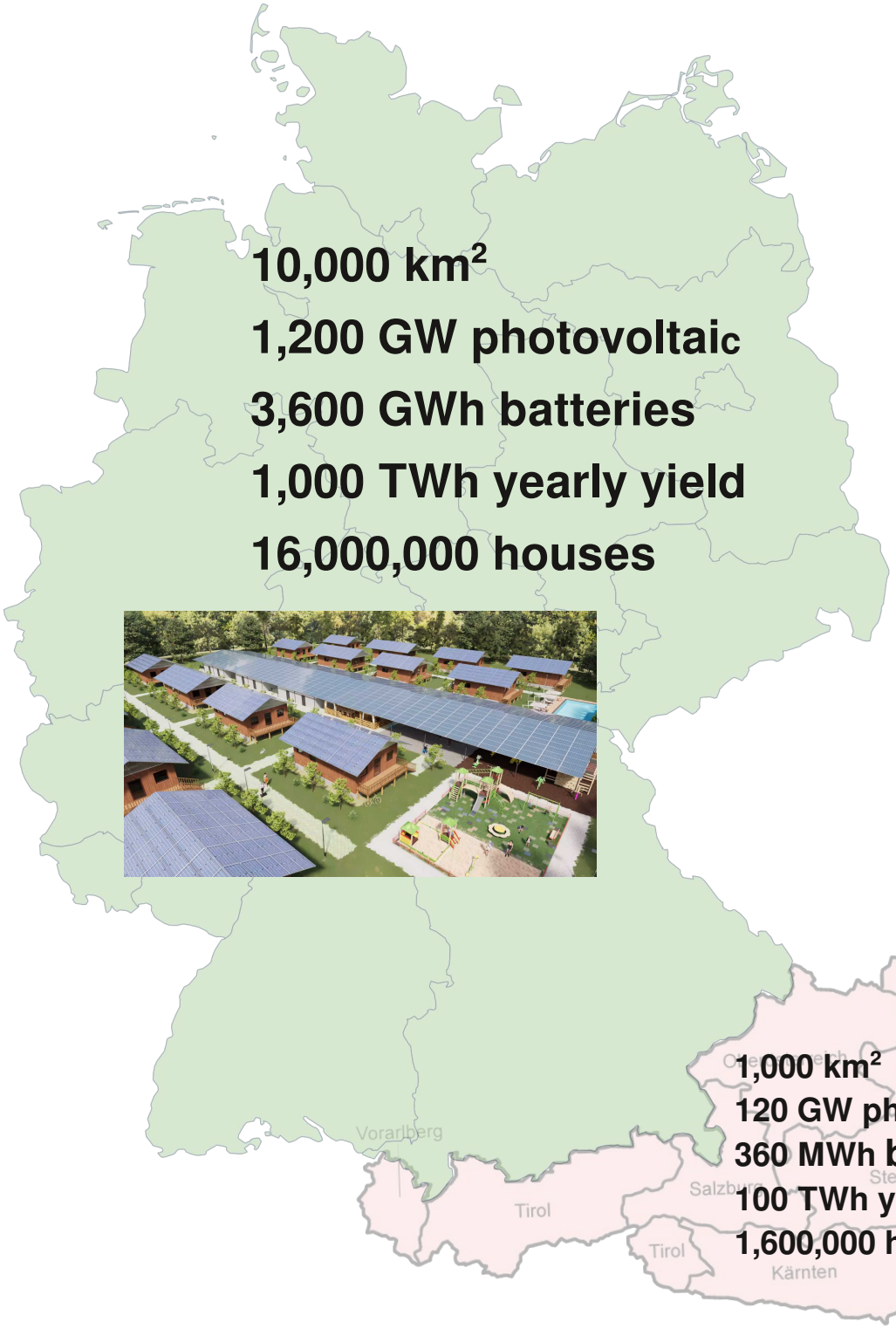
Building plot for lease.

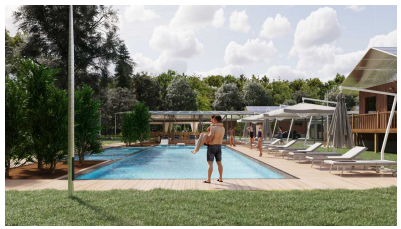
600 m²

36,000 kWh per year lease.

You have to deliver on demand,

according to our rules.





For example, Germany has 26,000 km² only for energy plants. Only 10,000 km² energy optimized settlements would be 1,200 GW peak photovoltaic, 3,600 GWh batteries, 1,000 TWh/a yield 16 million houses. 16,000 km² more for nature instead of 100% human usage for energy plants.

If all this were "Land for Energy" areas and the lease would be 60 kWh/m²/a, the government would have 600 TWh/a lease.

This lease could be used for cheap electricity for the industry to avoid that the industry is leaving the country.

4 Recycling by energy instead of biology

The current idea of a sustainable circle economy is based on the biological recycling. But this concept is very limited, as the Earth overshot day and the spell "We need 2 planets" shows.

Austria has much wood, but we think international. Building with wood in areas where even collecting firewood for cooking is a major problem? There is about 50 times more iron than carbon in the Earth's crust.

Having enough energy means far more recycling is possible. The first huge recycling will be the recycling of the CO2 in the atmosphere until we reach again 350 ppm CO2.

The longer a civilization exists, the more perfect recycling must become. Maybe we will throw in the future an old smartphone into a gas centrifuge to recycle all the materials by investing 500 kWh of electricity into this action.

So we think PU-steel composite and a steel frame is more sustainable than a wooden construction. The energy from one square meter photovoltaic can recycle more steel and PU than 10 square meter of forest can recycle wood.

5 Fast charging at each settlement

The houses will be mainly DC oriented, with about 3 kWh batteries per kW peak photovoltaic. So demand oriented grid feed in is possible. But this also enables fast charging. When one hectare of settlement has 3.6 MWh batteries, even fast charging of trucks is possible.

The inhabitants can offer fast charging at lower costs as usual. Much more fast charging stations with a lower price could accelerate the change to electric mobility.

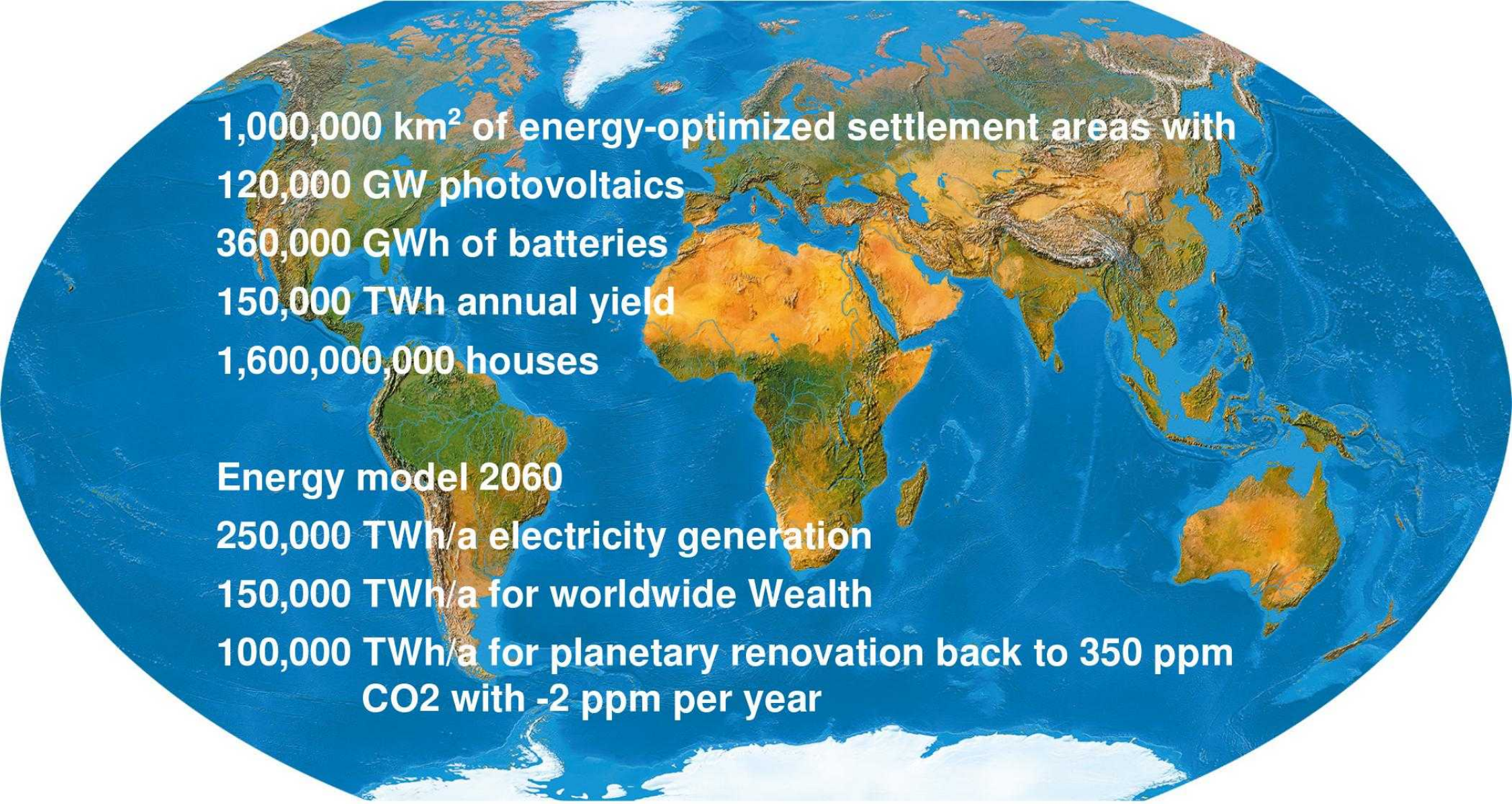
Africa leapfrogged the landline telephone system.

Could be the same with the grid. Off-grid fast charging settlements with the main purpose to deliver fast charging to electric cars.

From a single house capable of 80 kW fast charging up to villages charging even several trucks with 1 MW each at the same time.

A 3 km^2 energy optimized settlement could power a cement factory electric only for 500,000 t/a production.

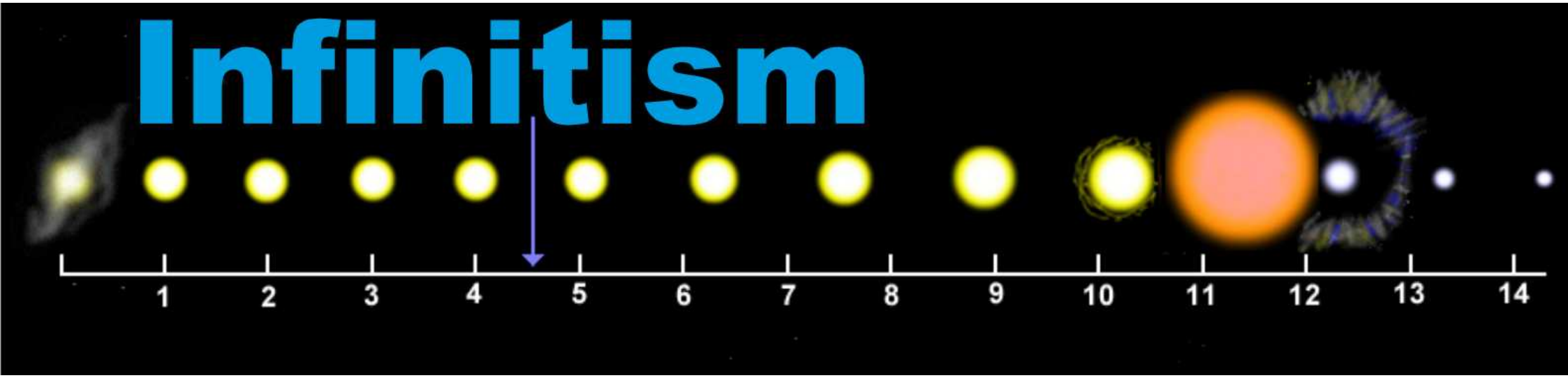
Africa needs streets and concrete is he ideal material after the oil age in a hot climate.



6 Targets for 2060

Humanity will succeed if it does not allow itself to be stopped. From 30,000 TWh/a to 250,000 TWh/a in 35 years, only 6.2 % more electricity production per year is required. The raw materials for this are available in abundance: Silicon for photovoltaics and sodium for batteries.

Worldwide wealth and a limitless future are possible if we overcome the destructive mindset of limitism.



Previous attempts to fend off limitism have led to unsustainable ideas such as “perpetual oil” and “let's carry on as before”, which we must also overcome.

7 Conclusion

The climate protection movement is in a sever crisis.

A reinvention of the entire climate protection movement is essential.

We cannot leave it to fossil energy fans to shape our future.

Human CO_2 Emissions per year

60 Gt Drill baby drill!

40 Gt Common climate change deniers

20 Gt net-zero emissions and all will be fine again

0 Gt real zero emission

-15 Gt Planet renovation back to 350 ppm CO_2 as proposed

-30 Gt Emergency! Nature starts to emit much GHG!

-45 Gt Big emergency!

-60 Gt Unexpected GHG emission from nature, we have to survive!

Previous approaches must be reviewed in terms of their feasibility and effectiveness against climate change.

The GEMINI next generation project with energy-optimized residential areas has the scope to be a very significant part of the energy transition and climate protection and, by contributing to planetary renovation back to 350 ppm CO2, is also pursuing much more efficient goals to get climate change under control.


Let's imagine an opinion poll in a 10-storey apartment block in a poor neighborhood.
Very likely that a majority here votes for climate change denier parties.
What would you be willing to do for climate protection?
Then there is a list of the usual demands and finally a photo of an energy-optimized residential area.

Would you be willing to move into your own home in such an area to protect the climate?

Sure, if I could afford it!

Rent plus running costs plus electricity plus fuel for the car is more expensive than the loan installment minus the proceeds from the sale of electricity, you would have more money left over.

Imagine what the answer will be.