Quantum CPV
A breifing

...we know what we are, but know not what we may be.

Hamlet: Act 4 Scene 5
William Shakespeare

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The dual challenge

> *Society now faces a dual challenge – to meet increasing demand for energy at the same time as reducing emissions of greenhouse gases. Other issues such as air quality and water pollution also need to be managed.*
>
> —BP Technology Outlook 2018

We are at a critical time of human history and our future is at our own hands.

We are facing a conflicting demands for:

- increasing energy supply
- lower emissions of greenhouse gases.

People have been consistently trying to contain the emissions of greenhouse gases, but much more have to be done, otherwise a not so optimistic future is waiting for us, and we are all experiencing it.

This challenge can only be solved by the advent of a new energy which is safe, secure, economical and environmental-friendly.

Now we proudly presents our *quantum concentration photovoltaics* (*qCPV*) technology:

Our Solution

Quantum concentration photovolatics technology revolutionized solar power generation.

Instead of participating in the fierce competition of raising the maximal output power of a solar cell, we have been focusing on researching methods of keeping a minimal output power of any solar cell, irrespective of the weather. Of course, in an economical way.

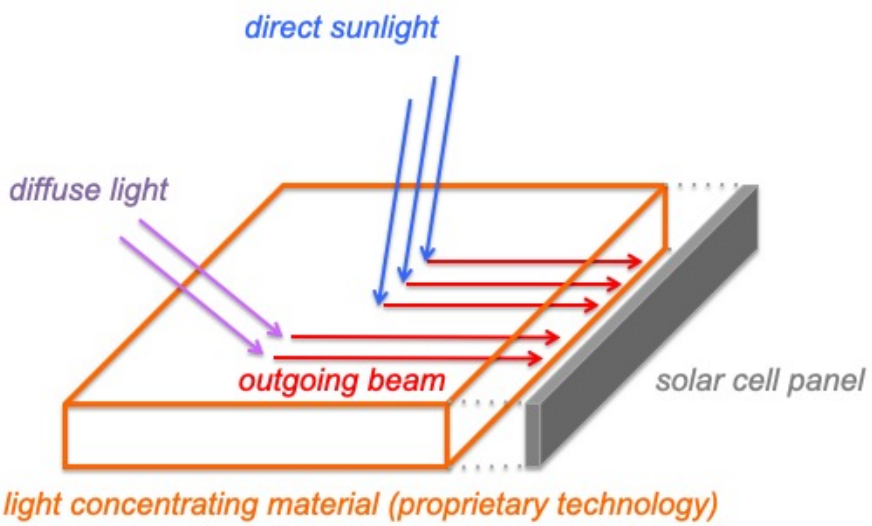
Illustration of *qCPV*

We manage to manipulate the collective behaviour of photons, requesting them to

- go to where solar cells are installed;
- cater to the frequency preference of designated solar cells;

via our unparalleled understanding of quantum optics and cutting-edge engineering techniques.

Schematic



When direct light and diffuse light reaches our panel, the photons will excite quantum processes in the *qCPV* panel, and then modulated photons emit to the solar cells attached on the edges of the *qCPV* panel.

Visually confirm the magic of *qCPV* here.

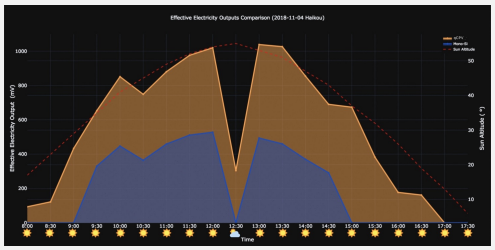
Quantum concentration photovoltaics technology has the following features:

All-weather

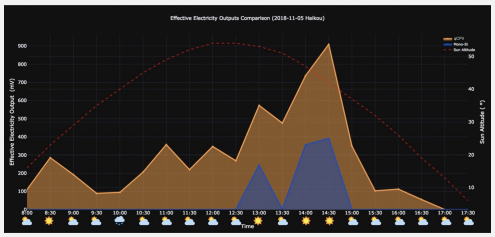
Current market solar cells rely heavily on direct sunlight. Energy of diffuse light accounts for half of the solar energy reaching the surface. In particular, during overcast and rainy days, almost all of the surrounding light energy are in the form of diffuse light.

qCPV technology welcomes both direct sunlight and diffuse light. See the following charts of a comparison between the effective output of a *qCPV* panel and mono c-Si solar cell panel. Areas of solar cells are the same.

a sunny day



a rainy day



- orange — effective output of the $qCPV$ module
- blue — effective output of the mono c-Si solar cell module

Our $qCPV$ technology panel is designed to output at least $24W$ electricity per m^2 of light reception area, as long as the environment light intensity is above $150W/m^2$. And experiments confirmed this functionality.

During a ten-day experiment, the total output of $qCPV$ module is 2.52 times the output of the mono c-Si solar cell panel. And the effective output is 7.27 times higher.

For a clear interactive plots of the two graphs above, click the links for the sunny day and the rainy day.

Low cost

Mono c-Si solar cells are expensive, which effectively excludes large scale installment without subsidies. but our $qCPV$ panel is affordable. The environment light intensity will be above the threshold of electricity generation as long as the sun altitude is above 20°, in spite of possible rainy days.

Below is a calculated power generation cost in three cities of Japan. We have included the cost of batteries for usage between sunrise and sunset. The unit of cost is JPY per kWh

City	Latitude	winter solstice	summer solstice	yearly average
Sapporo	43.05° N	8.82	2.66	5.74
Kyoto	35.01° N	5.40	2.74	4.07
Naha	26.23° N	4.36	2.84	3.60

For your information, the cost of electricity in Japan (2014) is 10.1 for nuclear power, 29.4 for solar power (residential) and 12.34 for fossil(coal) fuel power.

Frequency-modulation

We shift down certain higher frequency photons to lower frequencies, and this enables the following two traits:

1. The spectrum of the output light is much more favourable to the solar cell attached.
2. As many higher energy photons are transformed, this can reduce damages done to the microscopic structures of a solar cell, thus actually extends its lifetime.

Future-friendly and environmental-friendly

Solar power generation is a mature technology although very expensive. Our *qCPV* technology adds a de facto medium layer between the solar cell and the incident light. This technology was developed for solar cells, but combining with other technology, startling applications may emerge.

The energy generation process is obviously environmental-friendly. The production process of *qCPV* panels is also designed to have only a very minimal ecological impact. Questions about the details are welcome.

Examples of commercial products

Currently we propose the following four vehicles of commercialization. They are all achievable within 12 months once funds are already.

Solar cell efficiency enhancing film

A product applicable to almost all installed photovolatics modules.

The film powered by *qCPV* technology can output light with a spectrum more suitable to the band gap of the underlying solar cell. This is only a spectrum modulation, no light concentration occurs. The whole electricity generation amount raises from 5% up to 10% according to our field experiment.

Electric recharging point

Many cities around the world are starting to install soalr cell powered public charging stations. They can be used for charging phone, scooters, electric bicycles, or even electric cars if installed in a large scale. Compared with market products, our products provide

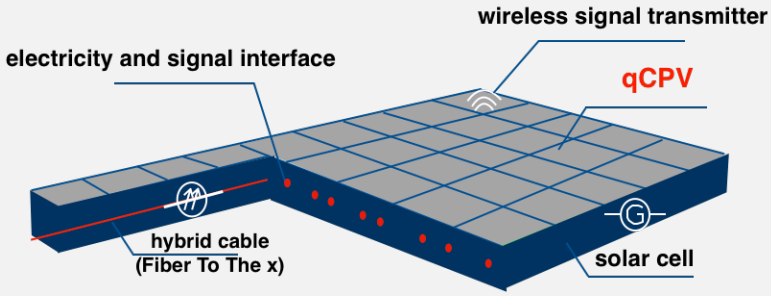
- much better economic profits
- higher space efficiency, as the light reception panel does not have to face the sun in an optimal angle
- better protection for the fragile solar cell. *Quantum CPV* powered panels can effectively be used to floor an outdoor parking lot.

Self-powered intelligent building

Integrating with external tiles of a building, *qCPV* modules can transform any building into a green power plant, where the building will be powered by light shining on not only the rooftop, but also any vertical surfaces outside. This integration is accompanied with hybrid fibres and customizable sensors attached to the panels.

external tiling

intelligent building basic module



Portable *qCPV* solar panel

A quick search of portable solar panel will lead you to many market portable solar panels. We will replace the solar cell used in those panels with our *qCPV* multi-junction solar cell, which outpace the electricity output and stability of all market portable solar panels, under the same light reception areas.

Investment methods

We propose the following two methods of investment:

Investing in a project

The fund provider(s) and Hainan Putian Solar Energy Construction Co.,Ltd will co-found a new company in Japan, and this company will be the unique company responsible for all business activities related with the project invested.

Investing in the fundamental technology

The fund provider(s) and Hainan Putian Solar Energy Construction Co.,Ltd will co-cound a new company, and this company will be the unique company responsible for the application of patents related with *qCPV* technology in any country. Patents in China are already obtained.

Afterword

A natural response of seeing such a technology is to looking for released similar market products, or at least its progress in the academics. The answer is, however, no, there does not exist any market competitor, and there is no research project comparable to our progress in any known research institutes around the world. For the numbered research groups in this field, we lead by 10 years.

Our research in *qCPV* began more than 13 years ago, and we were almost alone on this path since then. There were papers in this direction many years ago, but investigators and scholars had been gradually changed their research direction, as only a dim future can be anticipated at that time.

With that being said, we do encourage you to contact us if you were to be interested in this technology. I will present you with genuine *qCPV* samples and you can visually confirm the quantum light concentration effects even in a rainy day, or comparably, in an indoor environment. You are also welcome to visit our factory and research centre located in Haikou, China.

This is the technology that can change our world for the better, and at the same time, bring considerable economic returns. One person's power may be weak, but unite together we could build a future of well-beings. I sincerely invite you to join this great cause.

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