**Solar Power Generation**

Abstract

This article identifies the combined value that solar electric power plants deliver to utilities’ rate payers

and society’s tax payers. Benefits that are relevant to utilities and their rate payers include traditional,

measures of energy and capacity. Benefits that are tangible to taxpayers include environmental, fuel

price mitigation, outage risk protection, and long‐term economic growth components.

Results for the state of New York suggest that solar electric installations deliver between 15 to 40 cents

per kWh to ratepayers and taxpayers. These results provide economic justification for the existence of

payment structures (often referred to as incentives) that transfer value from those who benefit from

solar electric generation to those who invest in solar electric generation.

Introduction

“Economically viable” solar power generation remains a remote and elusive goal for the solar energy

skeptics because the cost of unsubsidized solar power appears to be much higher than the cost of

conventional generation.    Indeed, it does take a revenue stream of around 20‐30 cents per kWh to

justify a business investment in small to medium distributed solar electrical generation today. Large

centralized solar installations in the southwestern US are below a breakeven range of 15 cents per kWh.

A mix of federal and state incentives, whether tax‐based, or ratepayers‐levied, can make solar an

attractive investment in many parts of the US; feed‐in‐tariffs (FITs) have been particularly effective in

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Figure 1: Comparing finite and renewable planetary energy reserves (Terawatt‐years).

Total recoverable reserves are shown for the finite resources. Yearly potential is shown

for the renewables (source: Perez & Perez, 2009a)

2 – 6 per year 2009 World energy

consumption

16 TWy/year

COAL

Uranium

900 Total reserve

90-300 Total

Petroleum

240

total

Natural Gas

215

total

WIND

Waves1

0.2-2

25-70

per year

OTEC

Biomass

3 -11 per year

HYDRO

3 – 4 per year

TIDES

SOLAR10

23,000 TWy/year

Geothermal

0.3 – 2 per year

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0.3 per year 2050: 28 TWy

renewable finite

Europe and Asia. Without  incentives, however, the needed revenue stream for solar generation is still

considerably higher than the least expensive way to generate electricity today, i.e., via unregulated,

mine‐mouth coal generation.    This large apparent “grid‐parity gap” can hinder constructive dialogue

with key decision makers and constitutes a powerful argument to weaken political support for solar

incentives, especially during tight budgetary times.

In this paper, we approach the apparent grid parity gap question on the basis of the full value delivered

by solar power generation.  We argue that the real parity gap – i.e., the difference between this value

and the cost to deploy the resource  ‐‐ is considerably smaller than the apparent gap, and that it may

well have already been bridged in several parts of the US. This argumentation is substantiated and

quantified by focusing on the case of PV deployment in the greater New York City area. Since this is not

one of the sunniest places in the US, this paper should serve as an applicable case to other regions

and/or solar technologies.

**The Great Outdoors**

Plenty of Canadians still have the adventurous, pioneer spirit that built the country. People go canoeing down the 4,200 km of the Mackenzie River, which flows into the Arctic Ocean, or Whitewater rafting through the Fraser River Canyon in British Columbia. Some even go kayaking among the whales and icebergs up the west coast to Alaska.

With so much winter, it is not surprising that Canadians are good at winter sports. Champions such as Kate Pace and Rob Boyd have reached the top of international skiing. Resorts like Whistler and Lake Louise attract skiers from Europe and Japan. Ice hockey (simply called hockey) is so popular it is more of a religion than a sport.

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hong kong

Business is Best

Opium for Tea

Trade between China and the outside world has always been important for Hong Kong. In 1841, the British seized Hong Kong Island. They wanted to trade with China and having their own port meant they could force China to accept foreign trade. They could also continue to sell opium, which was shipped from India, to Chinese merchants. Profits from the opium trade paid for the Chinese tea, silks and porcelain that Britain wanted to import.

China resisted the illicit opium trade but was defeated by the British in two Opium Wars. The Chinese had to sign a treaty giving Britain the Kowloon peninsula in 1860. Britain took over another part of the mainland, called the New Territories, as well as 235 islands in 1898. These were on a lease from China, which gave the land to Britain for 99 years.

Hong Kong remained a British colony despite the victory of the Chinese Communist Party, which took over the rest of China, except Taiwan, in 1949. The colony's population grew from one million in 1946 to five million by 1980, as Chinese refugees poured in.

The economy also grew fast. In the 1970s, when Deng Xiaoping liberalised China's socialist economy, Hong Kong boomed because it acted as a trading link with the West. The British never gave Hong Kong's people full democracy, as they thought it might offend the Beijing government and harm trade between the colony and China.

China in Charge

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