Combined Heat and Power Economics & Financing

June 21, 2002

New York, New York

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What Makes a Great CHP Project?

Economic Drivers

#1 – **"Natural", Accessible and Abundant Thermal Load Dictates Technology, Operating Strategy & Savings**

- Hot Water and/or Steam

#2 – **Physical Logistics of Installation Dictate Cost**

- Easy to Install, Close Proximity to Mechanical & Electrical Interconnection Points, and Exhaust Location

#3 – **Reasonably Hi gh Electric Costs Dictates Savings**

- No $0.05 Power Applications – Works best above $0.10/kWh

#4 – **Utility Attitude Dictates Timing**

- No Ratched Demand Charges
- Reasonable Interconnection Requirements

#5 – **Scale Dictates Cost**

- Buildings Spending More Than $500,000 Annually
- Small Systems Are Hard to Make Cost Effective

Technology Selection for CHP

Best For Commercial Buildings

Technology	Pro	Con
Reciprocating Engines	♦ Versatile ♦ Cost Effective ♦ Efficient ♦ Automotive Emissions Controls	♦ Not good for steam based thermal loads. ♦ Big equipment - unwieldy for large systems. ♦ Maintenance intensive ♦ Noisy
Gas Turbines	♦ Best for large installations (3+MW). ♦ Good to address steam based thermal loads ♦ Reliable	♦ Small turbines are very inefficient ♦ Require SCR to limit emissions ♦ Noisy
Micro-Turbines	♦ Simple packages ♦ Reliable	♦ Very Inefficient ♦ Fairly Costly ♦ Noisy
Solar Photovoltaics	♦ Reliable ♦ Maintenance Free ♦ No Fuel, No Emissions ♦ Greatly Subsidized ♦ Mandatory Interconnect in Many Regions	♦ Costly ♦ Demand savings are not predictable
Fuel Cells	♦ Efficient ♦ Quiet ♦ No Emissions	♦ Costly ♦ Extremely Heavy
Steam Turbines	♦ Great where steam is required at multiple pressures	♦ Limited Application ♦ Usable Mainly in Industrials ♦ Not a cost effective substitute for PRVs
Wind & Hydro	♦ Limited Application	♦ Not relevant to Real Estate Industry

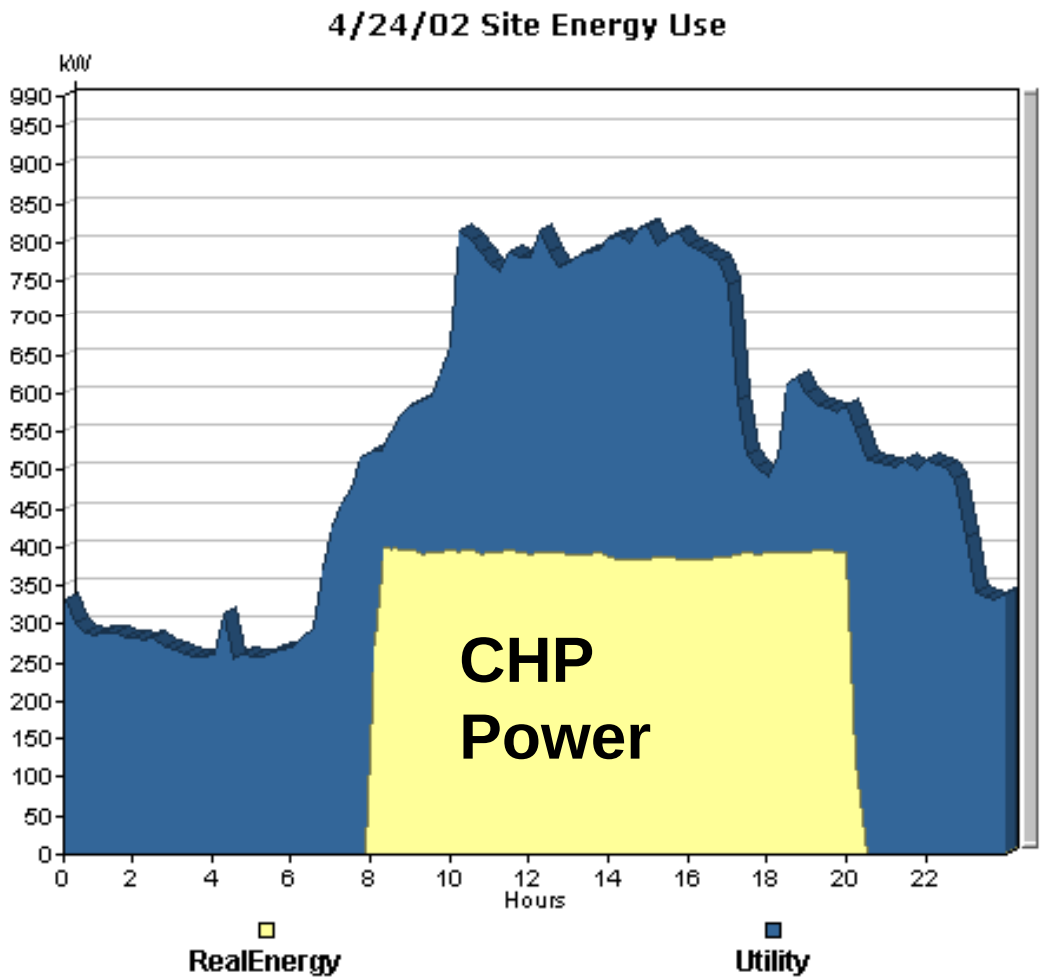
Best For Industrials

Installation Cost Considerations

- System Size
  - Small Systems Are Much More Costly
  - Larger Systems Provide Many Options
- Prime Mover
  - One Large Unit vs. Multiple Modular Units
- Soft Costs – Importance of Experience
- Physical Access to Thermal Load
- Physical Access to Electrical Feeders
- Physical Location (Ground, Roof, New Building - Rigging)
- Physical Access to Exhaust Stack
- Physical Access to Fuel (new gas line)
- Flexibility of switching (switchgear to operate stand-alone vs. parallel)
- Urban vs. Suburban vs. Industrial Locations
- Sound Attenuation

Operating Strategy #1

On-Peak



Saving Strategy:

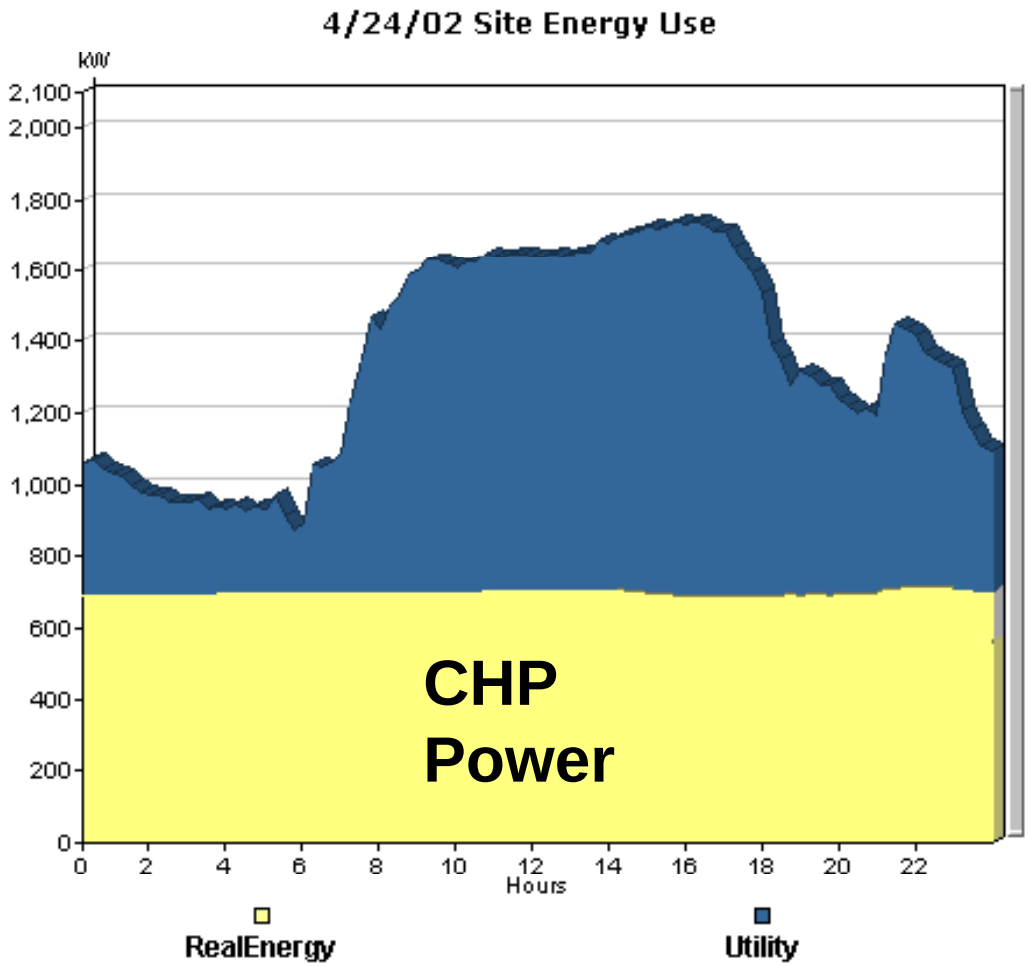
On Peak Energy Savings – Just the most expensive power

Application:

When there is little thermal Energy required off peak – Commercial Office Buildings

Operating Strategy #2

Base Load



Saving Strategy:

Energy and Demand Savings During All Periods – Whenever "Spark Spread" allows

Application:

When Thermal Energy can be used 24-hours per day – Industrials, Hotels, Hospitals & Certain Types of Office Buildings

Economic Projections

Components of Savings

(1) Cost Reductions

- On Peak Energy
- Off Peak Energy
- Demand Charges
- Thermal Energy
  - Chilled Water
  - Hot Water
  - Steam
  - Valued against appropriate fuel
- Operations & Maintenance
- ESCO Energy Purchases of "Residual" Power Requirements

(2) Expenses

- Fuel
- Operations & Maintenance
- Backup Power
- Insurance, Taxes, Misc

(3) Other Sources of Revenue

- ICAP
- Wholesale Energy Sales
  - EDRP & Day Ahead Sales

(4) Projections

- Escalators

Proforma Savings

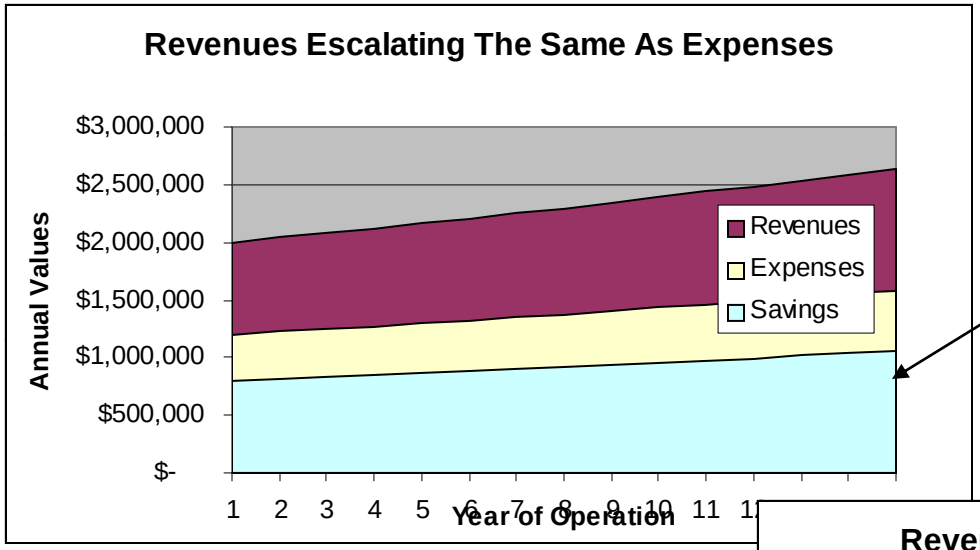
- Current Year Savings Projections (Vastly Simplified)

Proforma Cashflow Summary
12 Operating Months
June 14, 2002

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
(A) **Cogeneration Plant Sales**													
Electricity Sales	$116,622	$103,794	$124,729	$117,312	$113,086	$126,675	$129,836	$122,801	$135,451	$111,992	$112,462	$113,289	$1,428,050
Thermal Sales	$28,796	$26,778	$31,802	$32,513	$23,922	$24,513	$32,403	$38,015	$33,389	$39,683	$36,086	$30,855	$378,756
NYISO ICAP Sales	$16,200	$12,960	$16,200	$12,960	$16,200	$12,960	$16,200	$12,960	$16,200	$12,960	$16,200	$12,960	$174,960
Total Cogeneration Plant Sales	$161,617	$143,532	$172,731	$162,785	$153,208	$164,149	$178,439	$173,776	$185,040	$164,635	$164,748	$157,105	$1,981,766
(B) **Cogen Plant Expenses**													
Gas	$79,915	$66,186	$73,243	$75,690	$76,849	$75,088	$92,065	$95,101	$93,235	$94,899	$89,591	$78,772	$990,635
O&M	$14,798	$13,366	$14,798	$14,321	$14,798	$14,321	$14,798	$14,798	$14,321	$14,798	$14,321	$14,798	$174,236
Other (Standby, Insurance, etc.)	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$60,000
Total Expenses:	$99,714	$84,552	$93,041	$95,011	$96,647	$94,409	$111,863	$114,900	$112,556	$114,697	$108,912	$98,570	$1,224,872
(C) **Cogen Plant Net Income:**	$61,904	$58,981	$79,690	$67,774	$56,561	$69,740	$66,576	$58,876	$72,484	$49,938	$55,836	$58,535	$756,894

- Forward Savings Projections
  - Escalators for each line item
  - Sensitivities

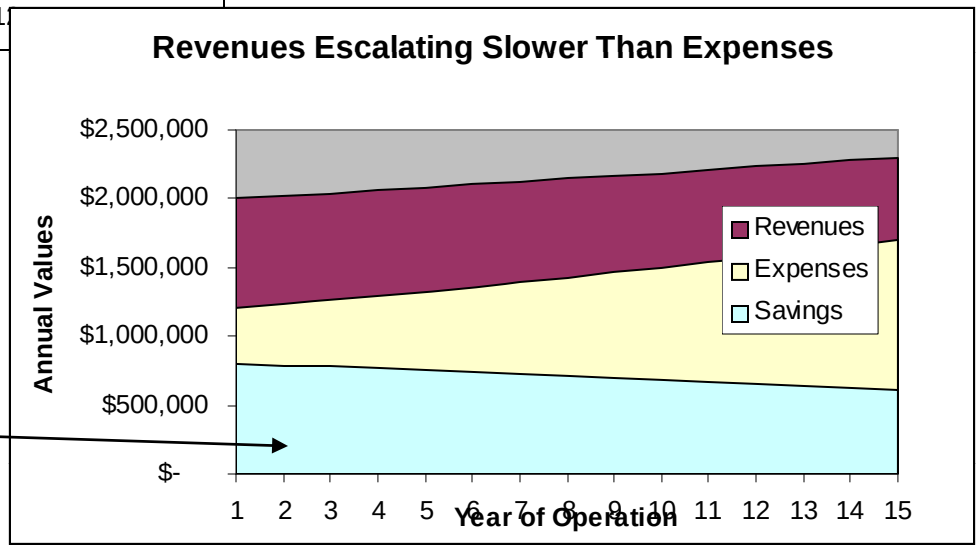
The Importance of Escalators



Savings Increase over Time

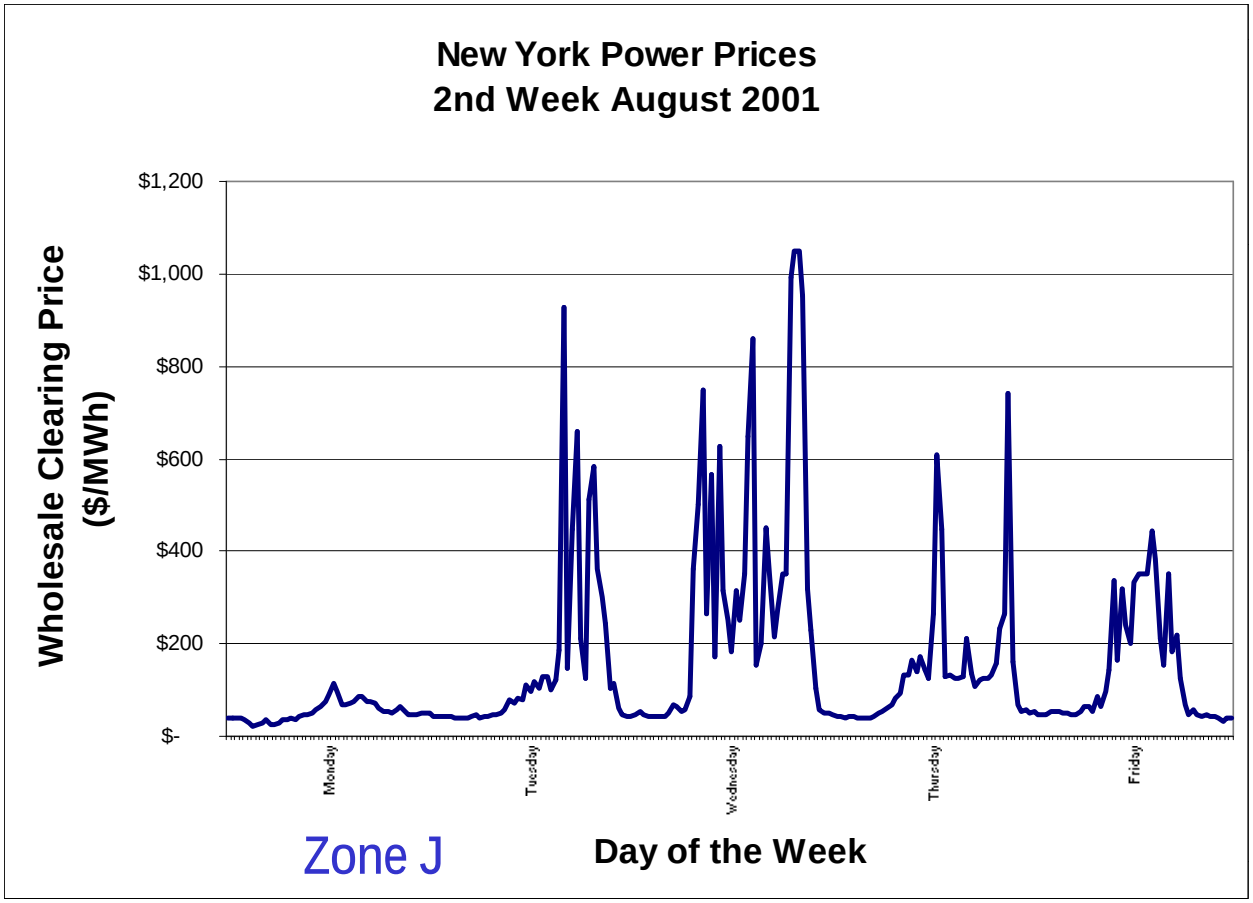
Or….

Savings Decrease over Time



Enhancing CHP Economics

Selling Wholesale via EDRP Program

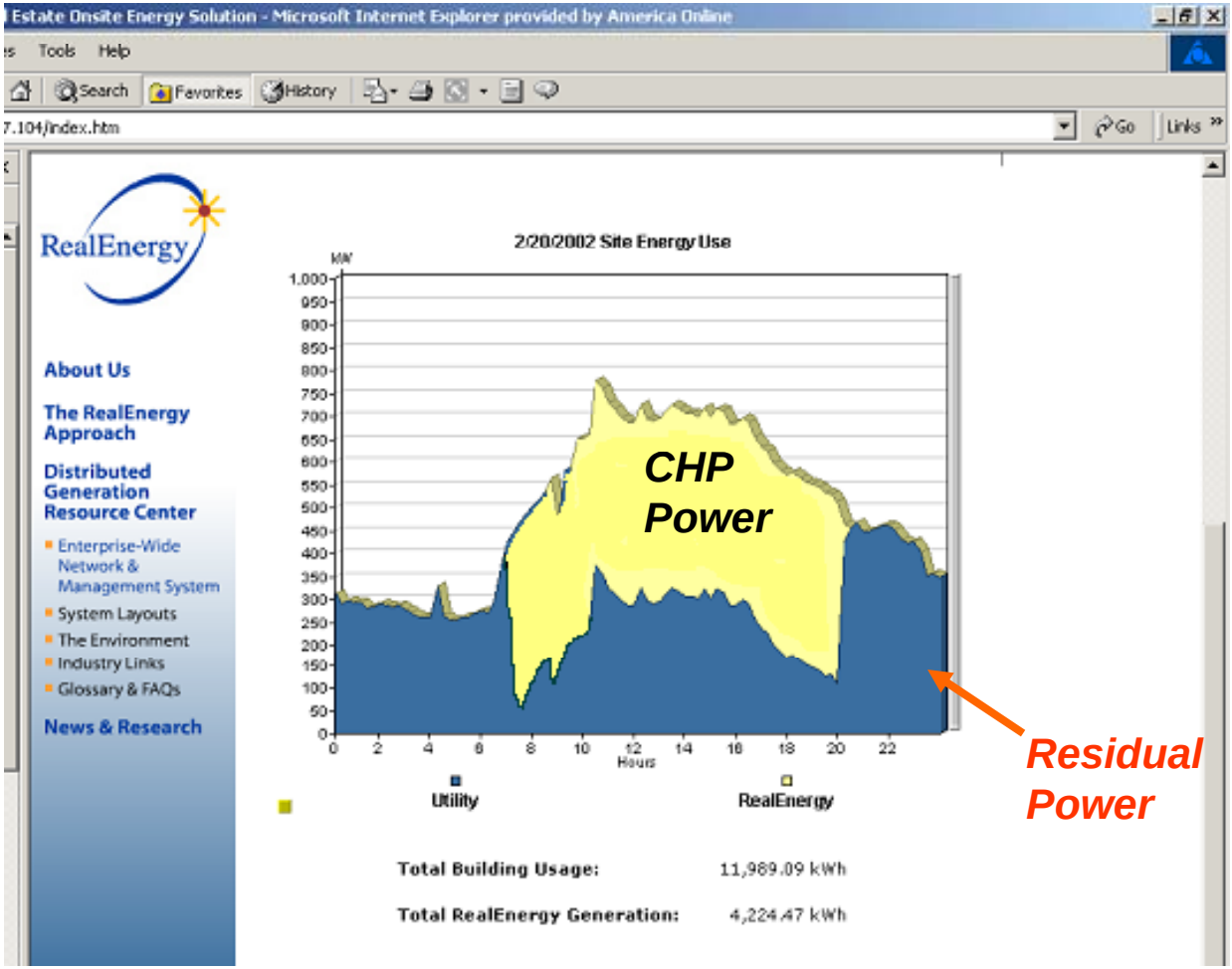


Opportunity:

Selling Power at Wholesale rates during ISO declared emergencies

Enhancing CHP Economics

Purchasing "Residual" Power



Energy Purchased From Traditional Suppliers *Before* CHP:

- 65% On Peak
- 35% Off Peak

Energy Purchased From Traditional Suppliers *After* CHP:

- 35% On Peak
- 65% Off Peak

CHP Radically Changes Your Purchased Power Load Factor

Enhancing CHP Economics

Defraying Installation Costs

Subsidies That Help Reduce Upfront Cost

- NYSERDA – Both Hard & Soft Costs
- NY Utilities are soliciting responses to RFPs to reduce “congestion” via DG. Funding levels vary.

Forward Projections, Hedging & Financing

- Escalators
  - Fuel Cost
  - Electric Value
  - Thermal Value
  - O&M
- Hedging Risk
  - Fuel Contracts
  - O&M Contracts
  - Electric Value?
  - Thermal Value?
  - Indexing
- Financing
  - Due Diligence
  - Assurity of Operating Margin
  - Hedging To Greatest Extent Possible
  - Expect:
    - High Debt Coverage Ratios
    - Partial Leveraging
    - Sensitivities

Overcoming the Hurdles

The RealEnergy Offer

Recognizing the Difficulties Developing “One-Off” projects, RealEnergy crafted an offer that gives owners many of the benefits of owning CHP without many of the associated risks.

- ***RealEnergy Sells Power, Chilled Water, and Hot Water at Prices that are at a discount to the best price owners can obtain from the market.***
- ***The offer costs owners nothing.***
- ***The offer creates a new revenue stream for property owners.***