Small Wind Turbines

Installing small wind turbine generators (WTGs) in the urban/built environment - What not to do...

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WTG Specs

Case Study: 3228 Idaho St., Berkeley, CA, USA

Make & Model: Aero Power Systems SL 1500 (1979)

- Designer: Mario Agnello
- Year installed: 1982
- Type: Horizontal Axis Wind Turbine [HAWT]
- Mounted on a 60’ Solargy Tower Monotube
- Orientation: Upwind
- Diameter: 12 ft [3.66m]
- Rated Power [max]: 1.5 kW
- Rated wind speed: 23.9-25 mph [10.7 m/s]
- Cut-in speed: 6 -8 mph [3.6 m/s]
- Cut-out speed: 101 mph [45 m/s]

Image courtesy of GoogleMaps
Cost & Site Info

Case Study: 3228 Idaho St., Berkeley, CA, USA

WTG Cost

- $3,000 [circa 1980]
- Total installation cost [City of Berkeley estimate]: $12,000
- Total charges actually paid: $17,000

WTG Site Info

- Medium height & density, residential (qualitative roughness)
- Buildings of mixed height (2-4 storeys) & mature trees
- Closely spaced detached & semi-detached houses
- Five-plex housing structure
“City’s first residential windmill...” *

- Developer touted 1/3rd of Berkeley’s 40,000 homes could be serviced by wind power
  - 400 kW/month
  - 90% of PG&E electric bill
  - State of CA 55% tax credit incentive
  - PG&E to purchase excess power generated @ $0.072/kWh (10 years)
  - 125 mph cut-out speed
  - Co-generated power

* 25 March 1982 The Berkeley Gazette, Page 4

Generating electricity closer to where it will be used makes sense, but...
One needs to consider the potential outcome...

- Lack of performance - decision rendered to decommission after three months (PG&E bill)
- Customer dissatisfaction -> legal action pursued
- Derelict WT for ~30 years
  - Free-wheeling for ~10 years (confirmed)
  - Brake cable accidentally (?) severed
  - Potential public safety hazard
  - Potential public & private property damage potential
As a consumer, caveat emptor...

- Know your wind resource
- Know your local ordinances
- Know how to site your WTG
  - Consider site characteristics i.e. minimal terrain roughness
  - Installation location - On or near the structure?
  - Installation location - If on a rooftop, how high above the rooftop should the hub height be to capture the accelerating wind coming over the rooftop parapet?
- Understand the WTG specs as per your individual requirements
  - Turbine mid-rotor height
  - Published data e.g. performance, power curves
UK Carbon Trust Wind Yield Estimation Tool (UK only)
References

Case Study: 3228 Idaho St., Berkeley, CA, USA

- Vossa Wysinger Family
- The Berkeley Gazette
- City of Berkeley, CA, USA
  - Planning & Development Office
  - Zoning Office
  - City Manager
- UK Carbon Trust