Tucson's Solar Experience: Developing PV with RFPs and PPAs

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Tucson's Solar Investment (1999-2008)

- $960,000 cumulative solar investment with City general funds.
- Over $200,000 leveraged from solar grants & utility rebates.
- Bus shelter solar funded through advertising.
- System size range: 3 kW- 64 kW (plus some solar hot water systems).
- 220 kW total installed on 8 City sites.

Pre-RFP Decisions: site selection

Plan A

- Property owner selects sites; vendor determines details and size of PV system;

and/or

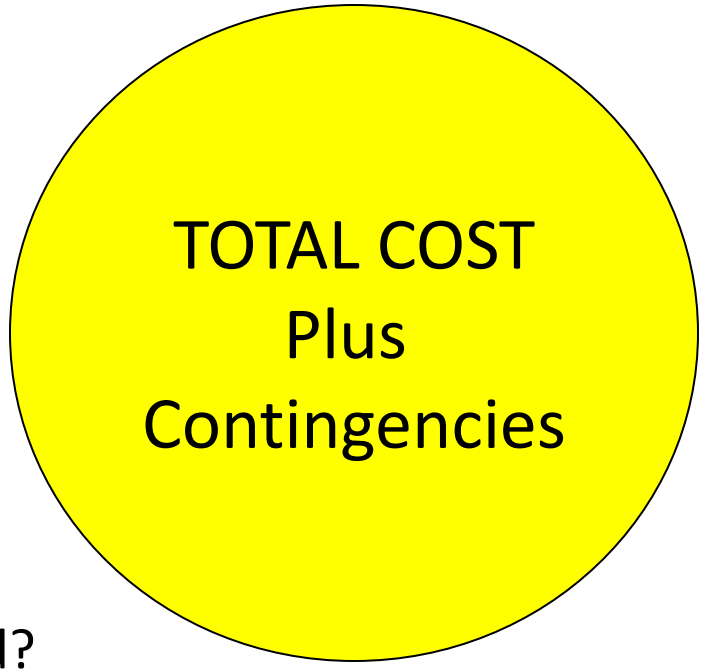
- Property owner does preliminary electrical load and structural capacity studies

Plan B

- Vendor selects sites from list of possible properties based on cost, ease of installation, utility company incentives, etc
- Property owner may predetermine total size of PV system or leave open
- Vendor performs all necessary studies

Analyzing Site Requirements

- **Electric load (critical if no ANM)
- **Structural analysis
- *Electric company interconnection requirements
- Roof coating condition?
- Access to roof adequate?
- Vandalism prevention needed?
- Zoning issues?
- Upgrade of electrical service needed?
- Road access/dust control?
- Special permitting issues? (habitat protection& native plant requirements; historical district rules)



Solar Ownership vs PPA

Ownership

- Owner deals with all maintenance issues
- No tax credits for cities, only utility rebates and tax swaps (if available)
- Stimulus funds and/or special bonds available?
- Need to budget for legal and financial costs
- Liability for long term bond payments

PPA

- All maintenance covered by third party
- Developer takes all tax credits and utility rebates
- Utility costs not on balance sheet
- Cost of power clearly defined for long term
- Legal and financial costs included in cost of power

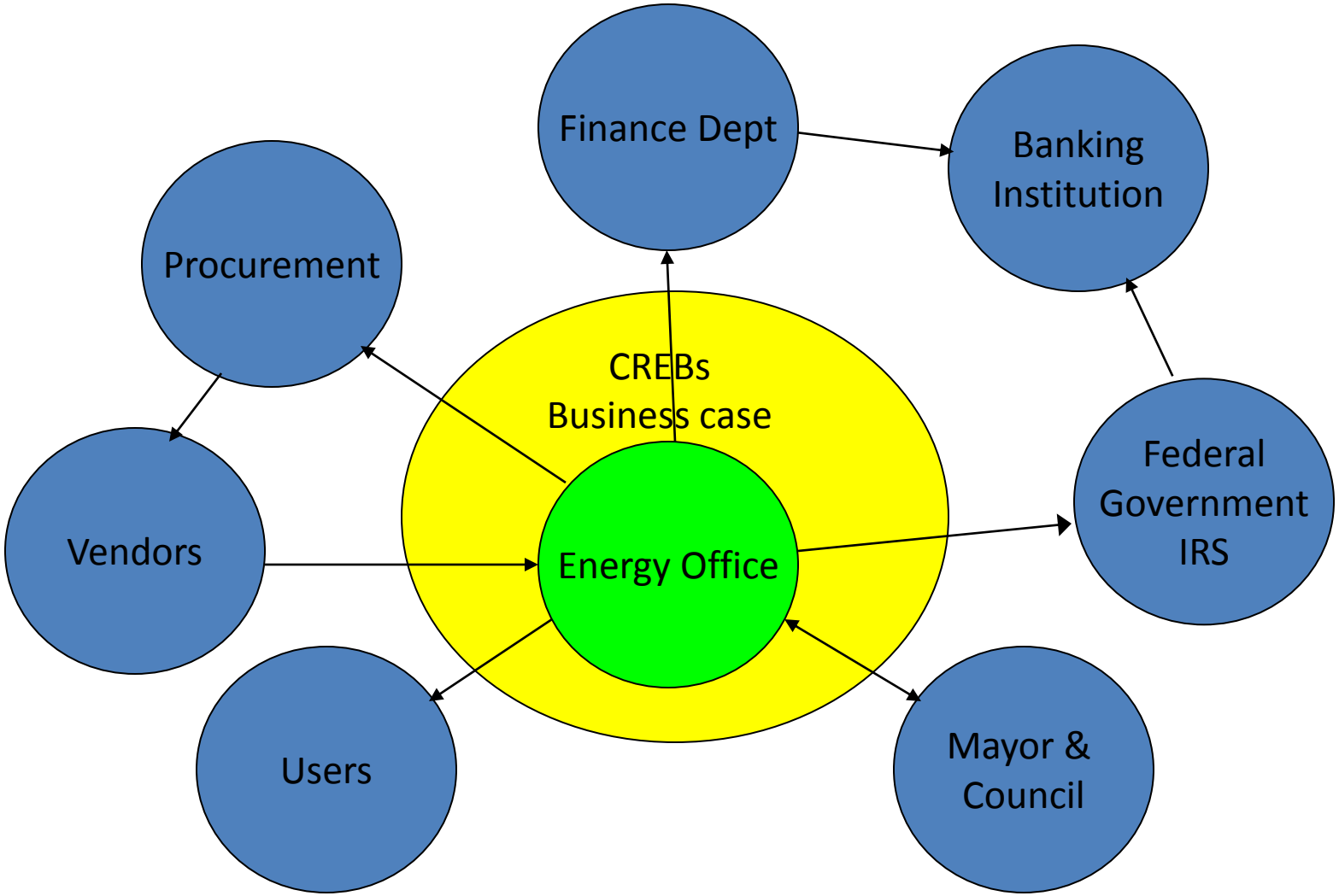
CREBs 1a-2007

- Issued RFP for combination PPA and CREBs bonds construction
- Sites determined by consultant; approved for CREBs by IRS
- City to pay for power for 20 years (PPA) then own the system without further payment
- No takers satisfactory to the City-no project
- Lesson learned: either PPA or City-owned

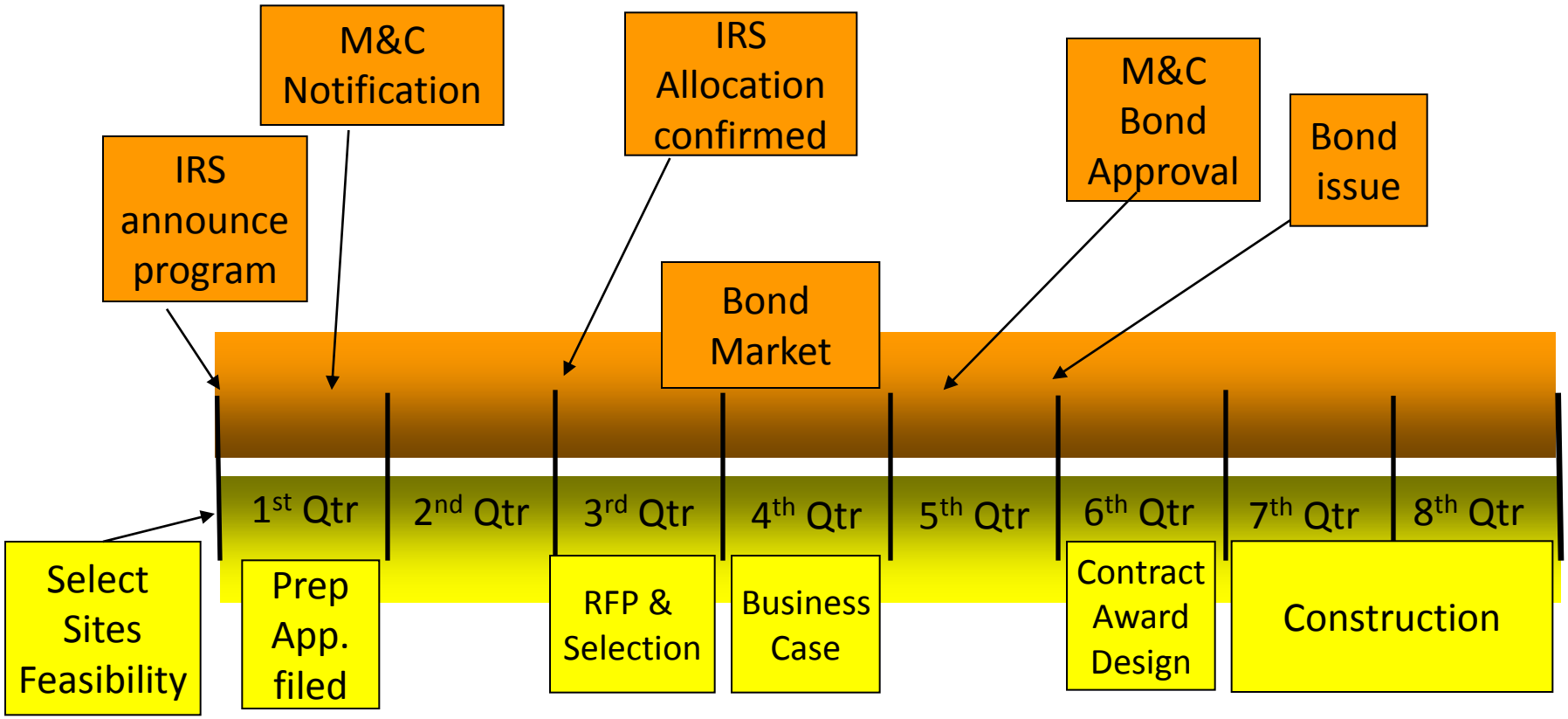
CREBs 1b-2010-1 MW

- Reissued as RFQ for design/build project
- City to finance with bond sale and own the projects (NOT a PPA)
- Separate RFP issued for bond placing firm
- 7 sites dictated by CREBS applications
- 10 yr O&M contract with solar vendor SPG Solar
- Solar production guarantee included
- Vendor contract contingent on bond placement

Facilitating CREBs



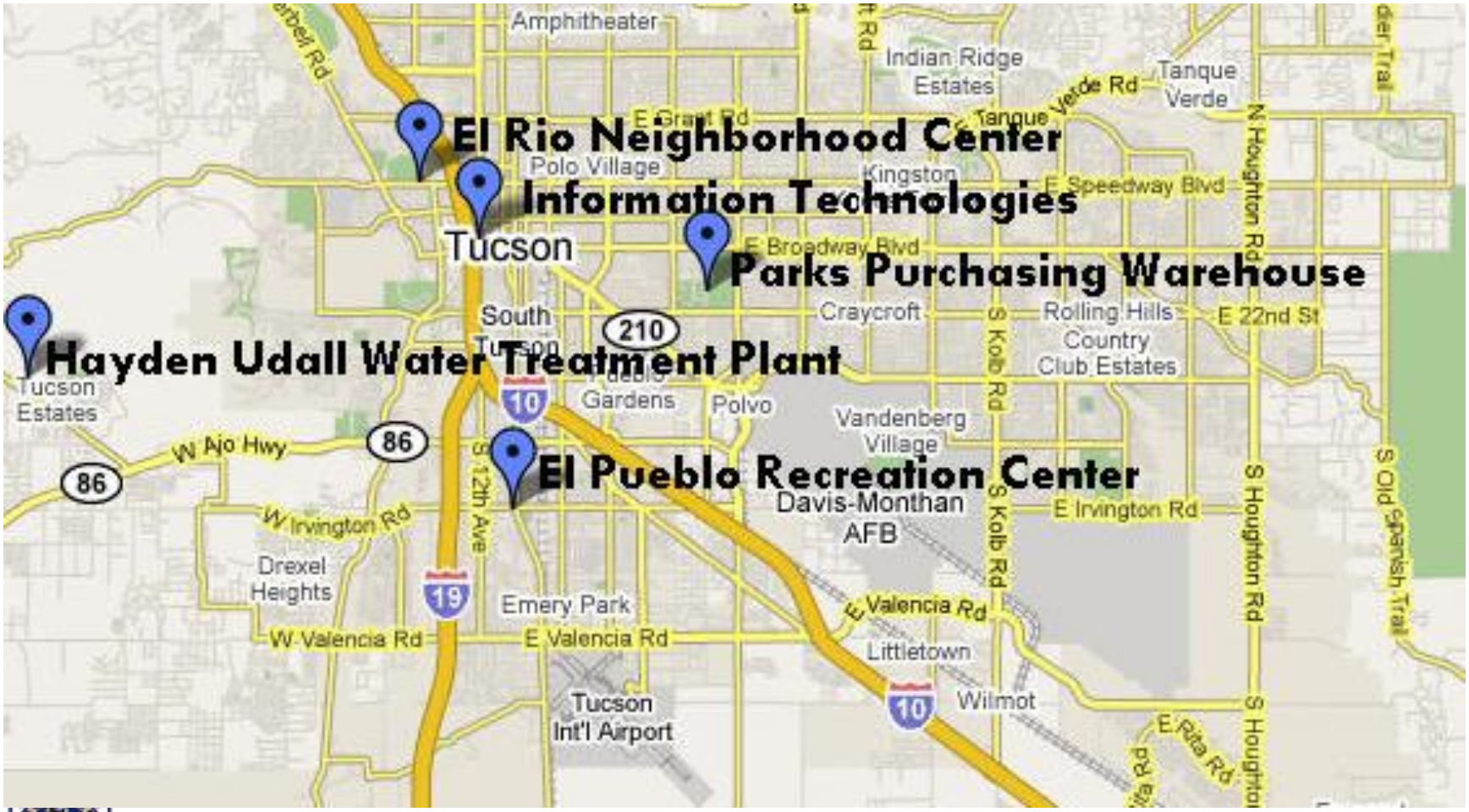
CREBs Timeline



How to pay for the bond?

- Created Internal Service Fund
  - Charged building occupants for electricity generated by solar at then current utility rate
  - Sold RECs; Tucson Electric PBI auction
- Critical Issues
  - To be cash positive the first year
  - Realistic hours of production (PV Watts 1 & PV Watts 2)
  - Monitoring of the system
  - Guaranteed production or “up time”
  - General Obligation Bond or Revenue Bond?
  - Repayment time frame (here 13 years), then “profit”

CREBs 1 sites



Technology decisions : Roof attachment issues:

- Ballasted systems-
  Heavy weight-sand,
  pavers, etc

- Standard racks-Roof penetration issues (leaks, roof warranties, etc.)
- Parking canopies
  or ground mounts
  as alternatives

Technology decisions: Fixed ground mount vs. tracker

Fixed ground mount

Single-axis tracker

Technology decision: Try new things?

- The now much-maligned Solyndra PV system
- ps –It's working fine!

Performance Tracking

- DECK, Draker, Power One and other companies offer 24/7 web-based monitoring.
- Alerts for malfunctions sent to vendor and customer.
- Ability to compare production from different facilities.

Tucson's 2008 PPA

- 1 MW 20 year PPA project with SunPower at water pumping station; now being reviewed for possible expansion
- Issues:
  - RFP issued as 1-5 MW PPA caused some confusion
  - REC ownership retained
  - Choice of trackers and panels
  - Purchase opportunities

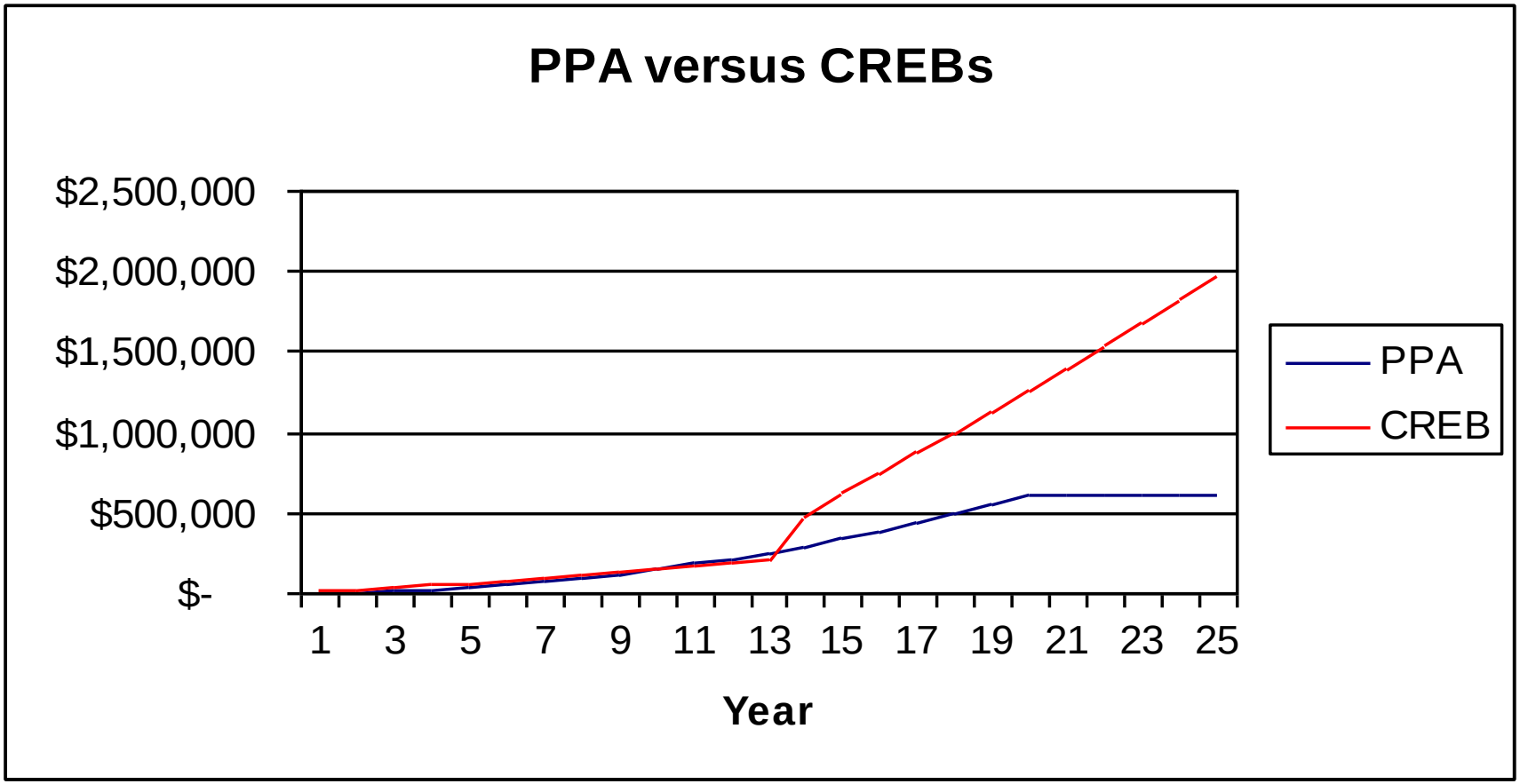
PPA or Own ??
General PPA Challenges

- Negotiate power costs no greater than current power cost and less than anticipated future power costs
- Costly to draft and execute.
- Not well suited for small (<200 kw) projects
- Requires legal oversight and close review to assure no hidden costs (insurance, permits, etc) to the customer.
- Various state regulators are still considering whether PPA providers are "public utility companies" and thus subject to regulation. In Arizona, PPAs (SSAs) definitely OK for non-profits and governments. Not totally clear for businesses.

PPA Lessons Learned

- Draft your own PPA ahead of RFP and start with that (several models available: see http://sustainablecities.asu.edu/about/workgroups/solar-energy-efficiency/)
- Avoid escalators if at all possible
- Be aware of the "curse" of demand charges
- Tighter credit market and reduced utility incentives may make PPAs less attractive
- Select vendor with substantial solar experience and sufficient engineering capacity

Tucson 2010 : Cumulative Savings



Assumes utility rates 3% inflation; Fixed 20 year contract @$.096/kWh

CREBS 2 (2010)-2 MW this time!

- RFQ /Design-Build again
- Sites designated per CREBS requirements
- Some structural analysis by consultants pre-RFQ
- Evaluation criteria: Technical concept: 30%; Long term service (O&M) experience: 25%; Experience of DB Project Team (20%); Project Innovation & Creativity (10%); Subcontractor Selection (5%); Q&A Responses (10%)

CREBs 2 issues

- Scale of project ($10 million) made it difficult for smaller local installers to bid, but some joined with GC's to bid
- Bonding the biggest issue for smaller companies
- Tried to use local equipment where possible (Schletter racks)
- Moved toward PV carports for police locations to protect electronic equipment in cars and deal with UHI issues

CREBs 2 issues cont'd

- Adjusted locations to reduce cost (bigger systems were cheaper)
- ARRA funds had special requirements
- With solar companies folding, even more important to choose vendors and suppliers who will be around to honor 25 year warranty and O&M contract
- Insurance is available for potential future "orphan" projects (ex. Solyndra)

Big New City projects:
Price Service Center- 1.1 MW +

Big New City Projects: TCC- 591 kW

New City Projects:
Miller-Golflinks Library/
Rincon Police Substation-141 kW

New City Projects: Midtown Service Center-250 kW

And now for something completely different!!!

Non-city RFP for Solar Benefits Tucson 2012

- Employer based solar discount program for home installations
- Selection of vendors by employee reps
- Outside of regular procurement procedure
- Local preference predominated vendor selection
- 92 residential installs resulted

Conclusions

- Spend time on the prep before issuing the RFP/RFQ
- Compare options at that moment
- Keep the RFP as simple as possible
- Consider bigger priorities (local business support, climate change plans, etc)
- Solar is a winning long term investment!

Questions/Comments?

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