

Distributed Resources in Okanogan County Electric Co-op: *Preliminary Feasibility Study Results*

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Putting Solar Electricity to Work

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PV in Washington? Hydro in Arizona?

- Washington ranks 4th in the nation for lowest rates

PV is attractive in states with high rates

- Washington utilities are winter peaking

PV is a summer peaking resource

- Washington's solar resource is in the bottom quarter of the U.S.

PV economics are related to solar resource

How Do You Justify PV in Washington?

- Use PV as part of a set of technologies
- Capitalize on PV's distributed benefits
- Recognize that your customers want renewable energy and PV can be used to satisfy these preferences

Description of Okanogan Co-op and Case Study

- The Co-op serves 2,100 members, has a 13 MW winter peak, has 39,000 MWh in annual sales, and has \$2 Million in revenue
- Mazama Feeder consumes 15% of electricity
- Half of the Co-op's growth is occurring on this feeder and the feeder is becoming constrained; 1,500 new homes could be built in the area, almost doubling the Co-op's size

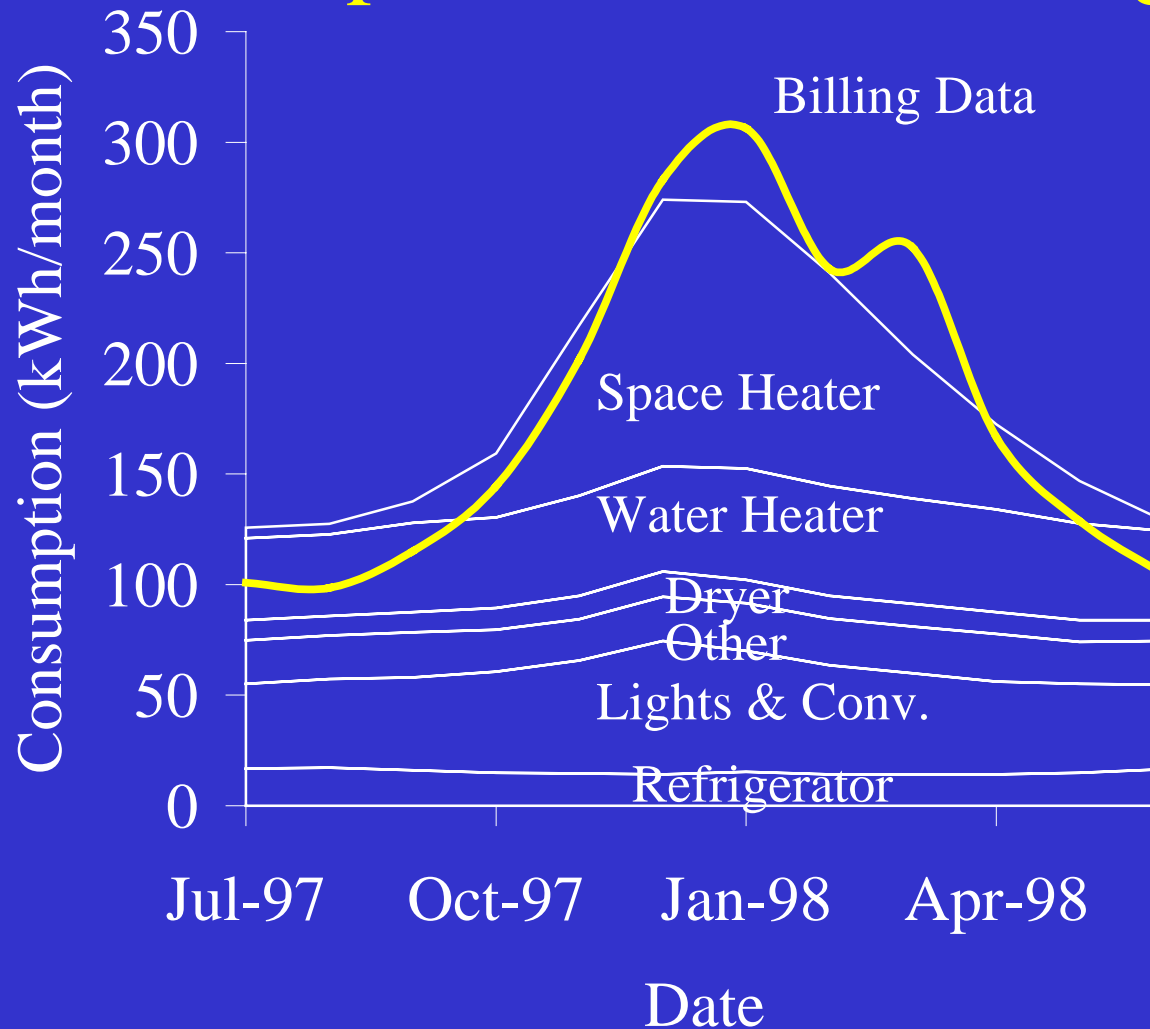
How Will the Co-op Deal With Growth?

- **Current Solution:** Spend \$2.3 million to upgrade the feeder to transmission voltage
- **Proposed Alternative:** Use distributed resources to satisfy increased demand
 - Moderate level of energy efficient appliances
 - 2 MW_{elec} of cogeneration for 1,000 homes
 - Propane space/water heating for 500 homes
 - 0.5 MW photovoltaics (PV)

Evaluation Approach

- Develop model
 - Evaluate technical feasibility
 - Determine economic feasibility (net pres. value)
- Input Data
 - Hourly load data measured at Winthrop Sub.
 - Okanogan monthly billing data for existing cust.
 - End-use load data from BPA for representative residential customers

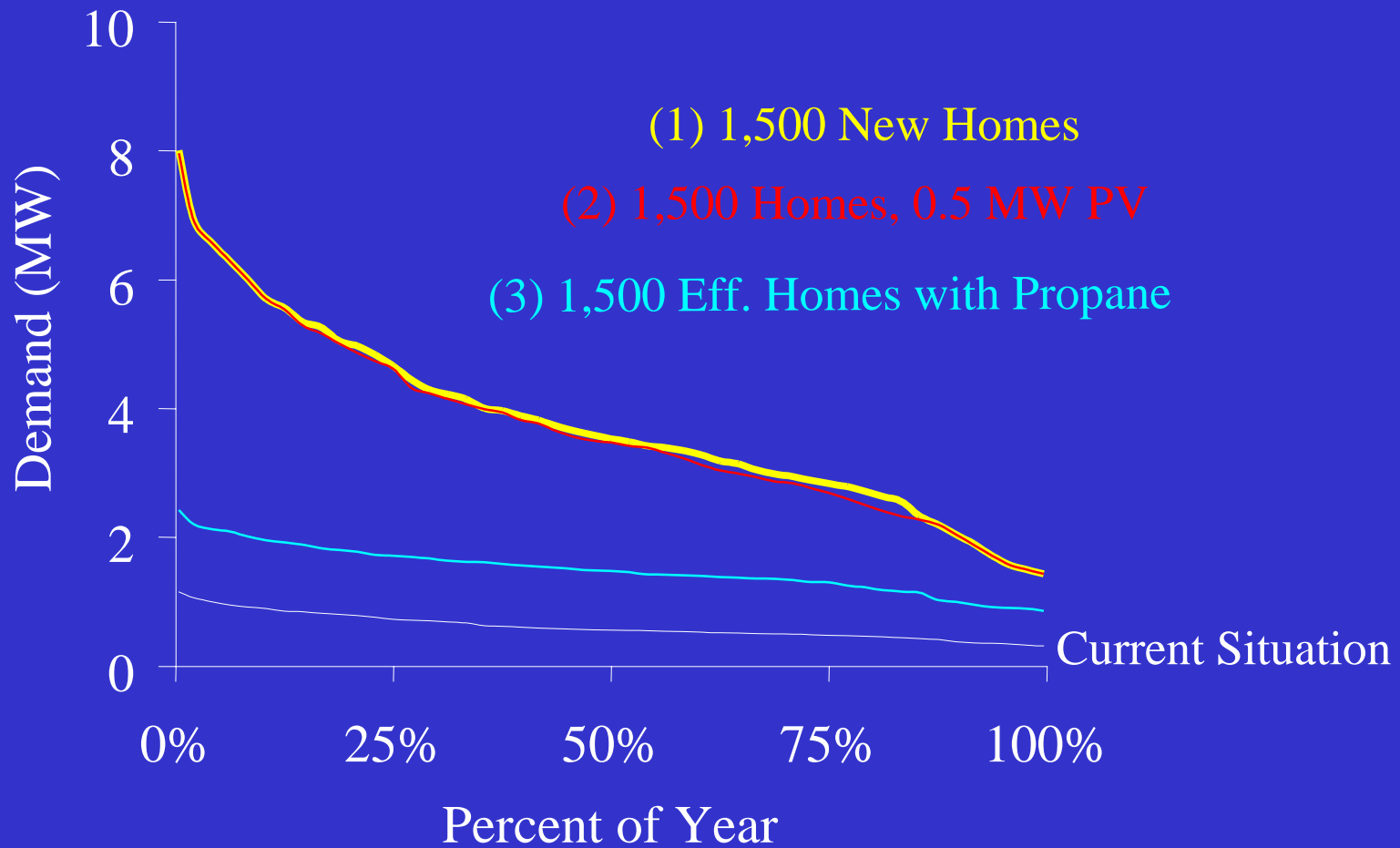
Verify Model: Model Compares Well To Billing Data



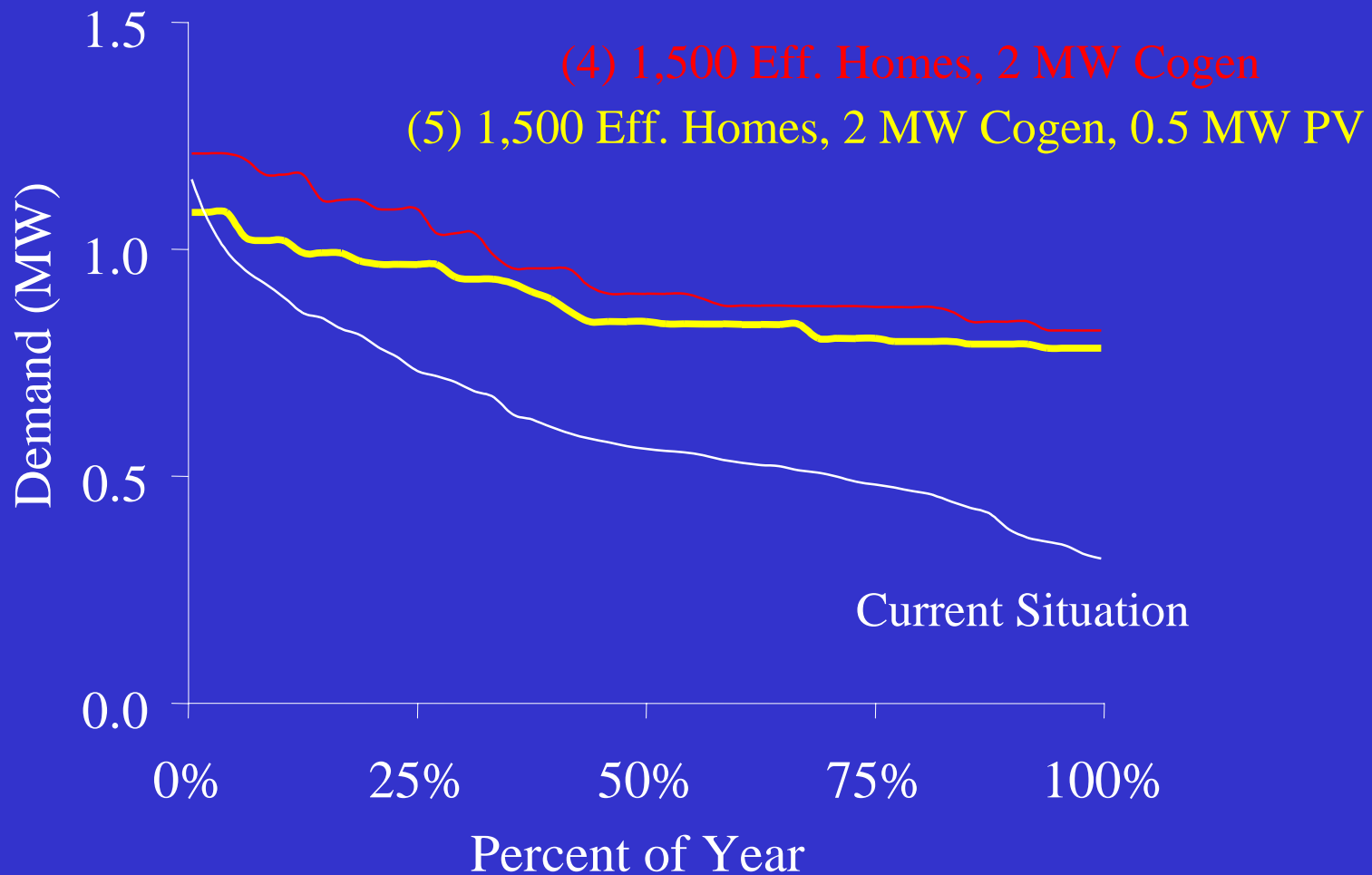
Consider 5 Scenarios

- (1) New homes same as existing homes
- (2) New homes same as existing homes but with 0.5 MW of PV
- (3) New homes have propane heating and efficient appliances
- (4) 1/3 new homes have propane heating, 2/3 have cogeneration; efficient appliances
- (5) Same as (4) but add 0.5 MW PV

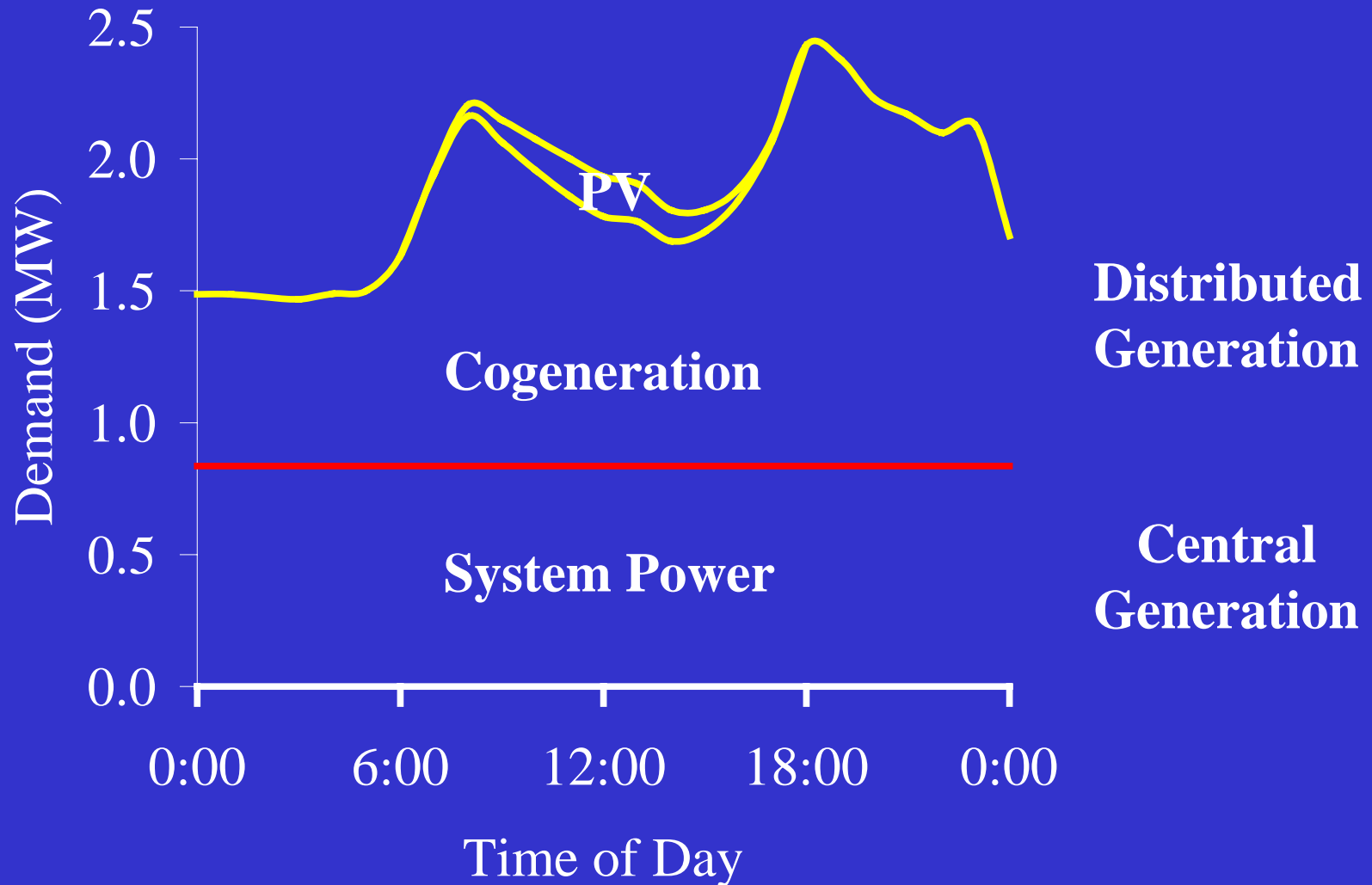
Results for Scenarios 1, 2, 3 (Annual Load Duration Curves)



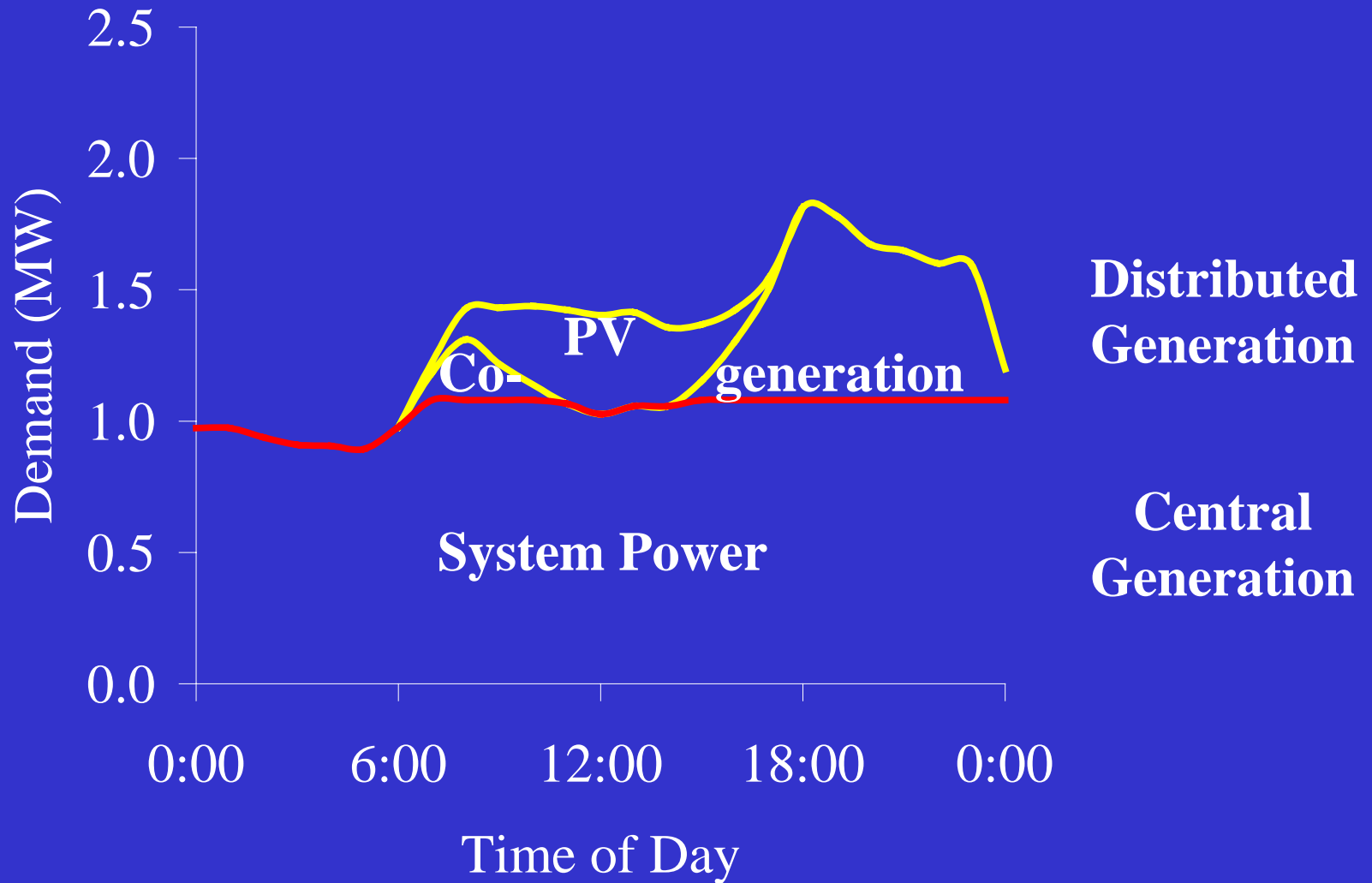
Results for Scenarios 4, 5 (Annual Load Duration Curves)



Sample Day in January



Sample Day in August



Key Economic Assumptions

- It costs \$2.3 million to upgrade feeder
- For *each* of the next 10 years:
 - 150 homes are built
 - Co-op installs additional 200 kW cogeneration at cost of \$200K
 - 50 customers install a 1-kW PV system (50 kW/yr)
 - Co-op waives \$1,000 system access fee for these 50 customers at an effective cost of \$50K

Results

- Upgrading the feeder immediately to transmission line has a NPV of a **negative** \$1.2 million
- Satisfying demand using distributed resources has a NPV of a **positive** \$0.2 million
- Conclusion: The distributed alternative could save the Co-op \$1.4 million. This is 70% of the Co-ops current annual revenues

Next Steps

- **Verify the findings of this study by employing services of engineering firm**
- Implement efficiency in new homes
- Enter into partnerships with developers/home owners associations to use cogeneration
- Encourage other homes to use propane heating
- Waive system access fee for customers who want to install 1-kW+ PV system