Department of Energy
Office of Energy Efficiency and Renewable Energy
TRIBAL ENERGY PROGRAM
Project Review Meeting
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POWERING REMOTE NORTHERN VILLAGES WITH THE MIDNIGHT SUN

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Project Overview

- Our village electricity depends on diesel
- Diesel gensets are relatively inexpensive

- Diesel fuel is not: ~~***$4.75* per gal***~~ **that was last week, today it's *$5.75***
- Diesel pollutes when burned or spilled, and we have great spill potential …

Project Overview (cont.)

- Make-do fuel tank farm

- Supply failure, thankfully not a fuel delivery

Project Overview (cont.)

We face high energy costs:

- **$0.51 per kWh electricity**
- **$6.75 per gallon gasoline**
- **$5.75 per gallon heating fuel**
- **$130 per 100 lb propane**

Project Overview (cont.)

- **Our villages want to:**

  - save money spent on electricity
  - reduce pollution and fuel spill risks
  - maintain our subsistence way of life

- **Our Elders have chosen to:**

  - adopt renewable energy & efficiency
  - banish oil dependency

Project Overview (cont.)

- **Tribal Energy Program funded an exploration of available renewable & efficiency technologies, their potential benefits & costs**

- **Our winds are light, waters flat, crops slack, trees sparse, but our summer is pure sun**

- **We like our clean, low-maintenance, quiet, free-fuel-delivered-free *photovoltaic systems***

Project Location

- Gwich'in villages in northeast Alaska, adjacent to Arctic National Wildlife Refuge
- ANWR known as "America's Serengeti," with 170,000-strong Porcupine Caribou Herd, largest free-range herd outside Africa
- Our culture, tradition, & subsistence depend upon the caribou
- No roads, all goods delivered by plane

Project Team

- **NVVTG**
  Native Village of Venetie Tribal Government
- **Arctic Village Electric Utility**
- **Venetie Electric Utility**
- **EES**
  Earth Energy Systems
- **IPEC**
  Independence Power & Energy Consulting
- **NREL**
  National Renewable Energy Laboratory

Project Objectives

- **Determine feasibility of hybrid village power system using diesel, renewables, & energy storage:**
  - **identify & implement low-cost electric efficiency improvements**
  - **compile power data from our PV systems operating since 2001**
  - **examine electrical use history to improve efficiency & management**
  - **computer model hybrid system variables, operation, & costs**

Project Objectives (cont.)

- **Determine parameters of hybrid village power system renewables & energy storage from model results:**
  - **identify good-better-best technology options for system components**
  - **determine best-cost options for diesel & PV system kWs & battery kVA based on models**
  - **develop business plan to seek funds**
  - **promote plan & leverage project results toward implementation stage**

Project Status

- **Accomplishments**

- **Three Council Meeting held on project**
- **Arctic Village PV tracker complete**
- **project presentations before ~4000 tribal people total in AK & Canada**
- **educational presentations to village schools**
- **energy conservation program ongoing**
- **whole-village power analysis ongoing**

Project Status (cont.)

- **Accomplishments (cont.)**

- **3-year PV performance history near completion**
- **fuel purchase history collection complete**
- **electric billing history collection ongoing**
- **centralized wood boilers found not feasible**
- **additional waste heat recovery feasible**
- **MET tower awaiting air freight to village**
- **1 of only 3 community groups from AK presenting renewables to tribal audiences**

Project Status (cont.)

- **Technical & Management Issues**

- **PV monitoring web-interface abandoned**
- **PV monitoring dial-in phone disconnected**
- **PV photocell failure reduces output**
- **Arctic Village billing history not available**
- **Arctic Village power system in flux**
- **power recording equipment problems**
- **power data from other villages unavailable**
- **power plant operator reluctant to participate**
- **staff turnover & short-term hiring difficulty**

Project Status (cont.)

- **Activities To Be Completed**

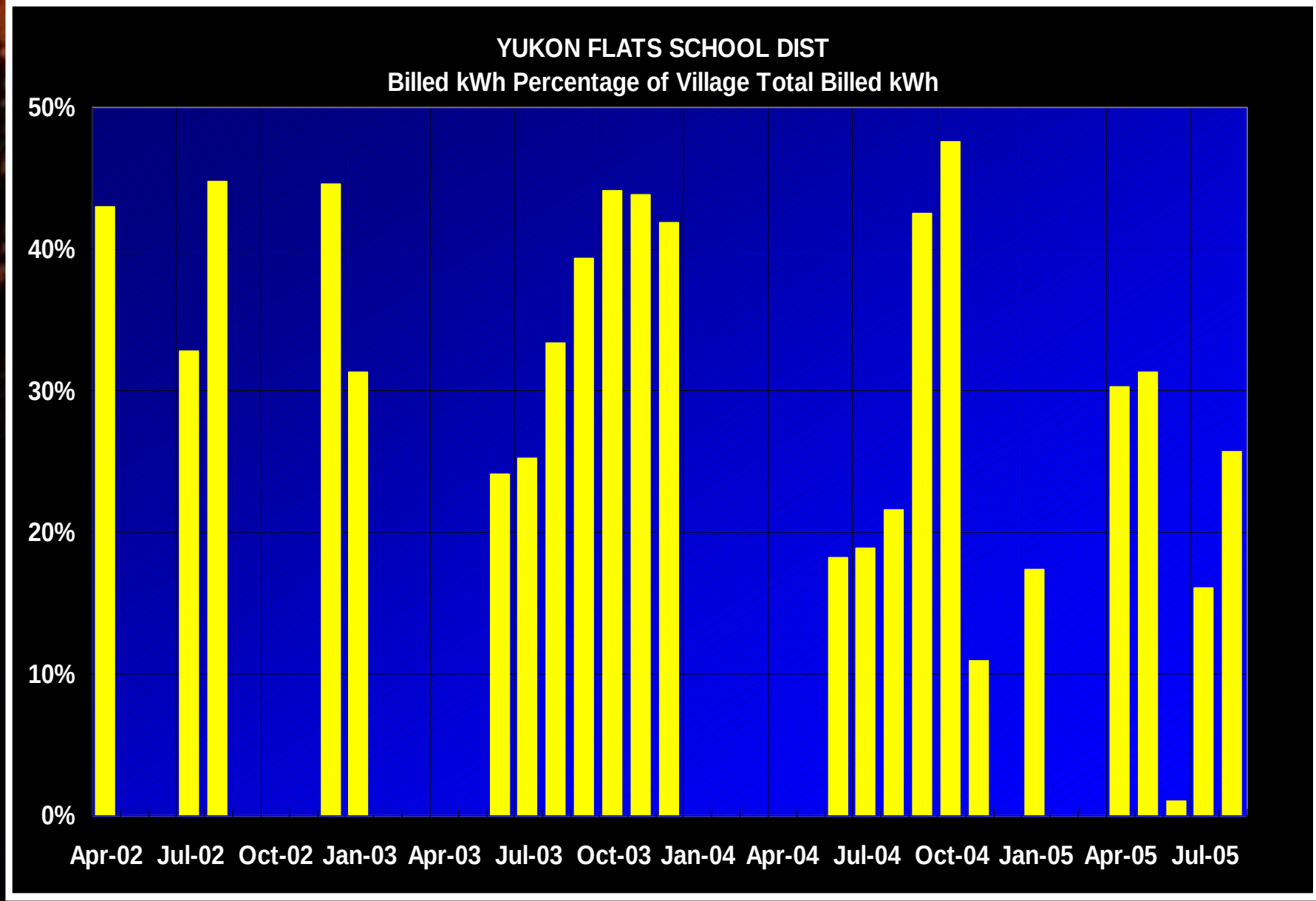
- **electric load profiling based on utility billing history & power recording**
- **identification of power swell sources**
- **consideration of treatment & involvement of largest electricity user in village**
- **computer modeling of hybrid system**
- **specification of best hybrid system options**
- **hybrid system business plan development**
- **pursuit of funding for implementation**

Future Plans

- Continue power monitoring to develop complete load profile
- Develop approach to treat largest user in village & their self-generation option
- Identify peak load sources & opportunities to reduce or re-schedule
- Run hybrid system computer models
- Prepare business finance plan to implement hybrid system
- Pursue funding opportunities
- Assist utilities to qualify for PCE monies

? Questions ?

Appendices


YUKON FLATS SCHOOL DIST
Billed kWh Percentage of Village Total Billed kWh
50%
40%
30%
20%
10%
0%
Apr-02
Jul-02
Oct-02
Jan-03
Apr-03
Jul-03
Oct-03
Jan-04
Apr-04
Jul-04
Oct-04
Jan-05
Apr-05
Jul-05

Appendices (cont.)