Commercial Energy Efficiency & Renewable Energy Forum

7 May 2012

Craig O'Hare, Erik Aaboe: Energy Specialists

Office of Renewable Energy and Energy Efficiency

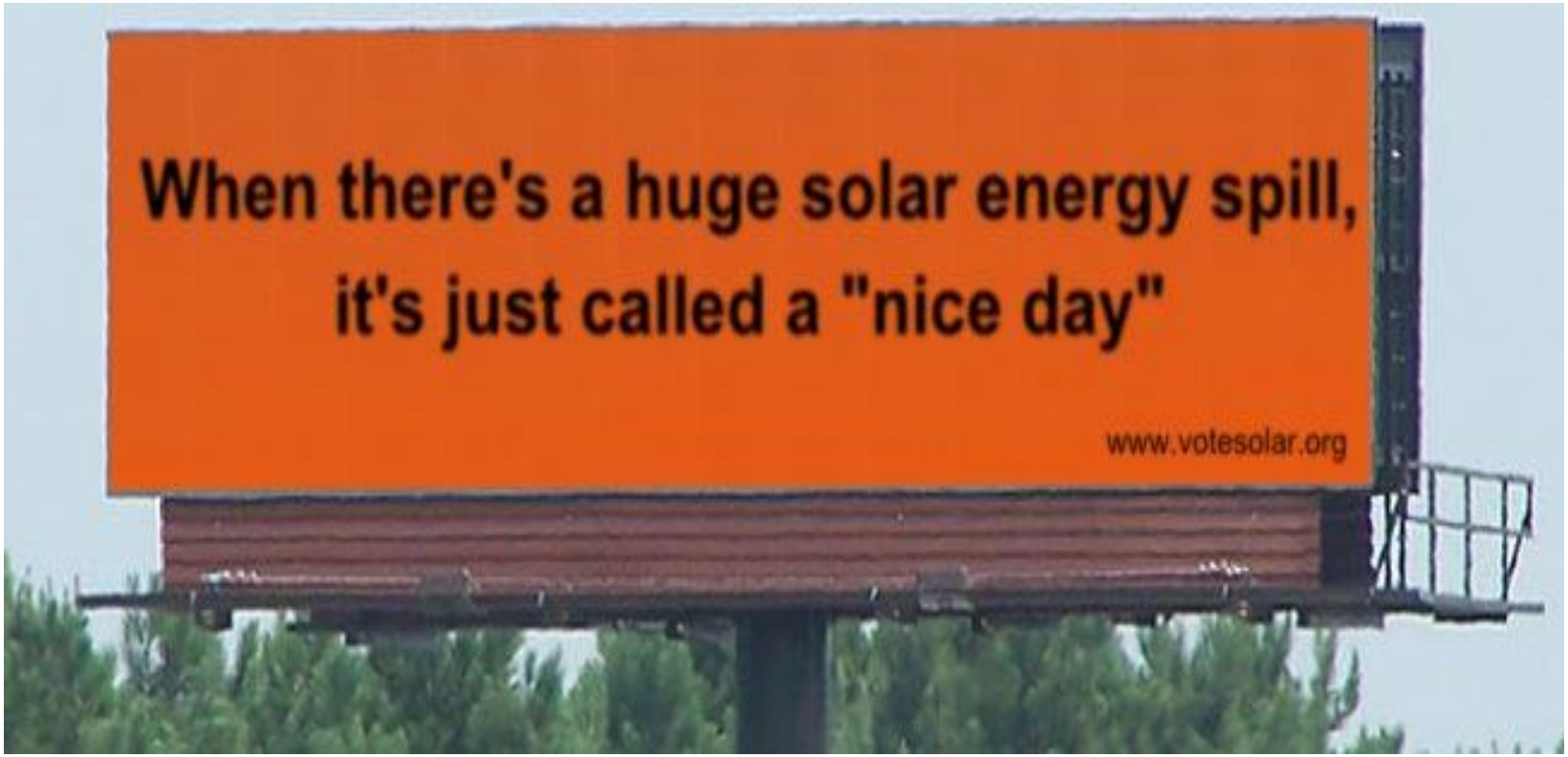
http://www.santafecounty.org/public_works/energy

Tonight's Program 6:00-7:30

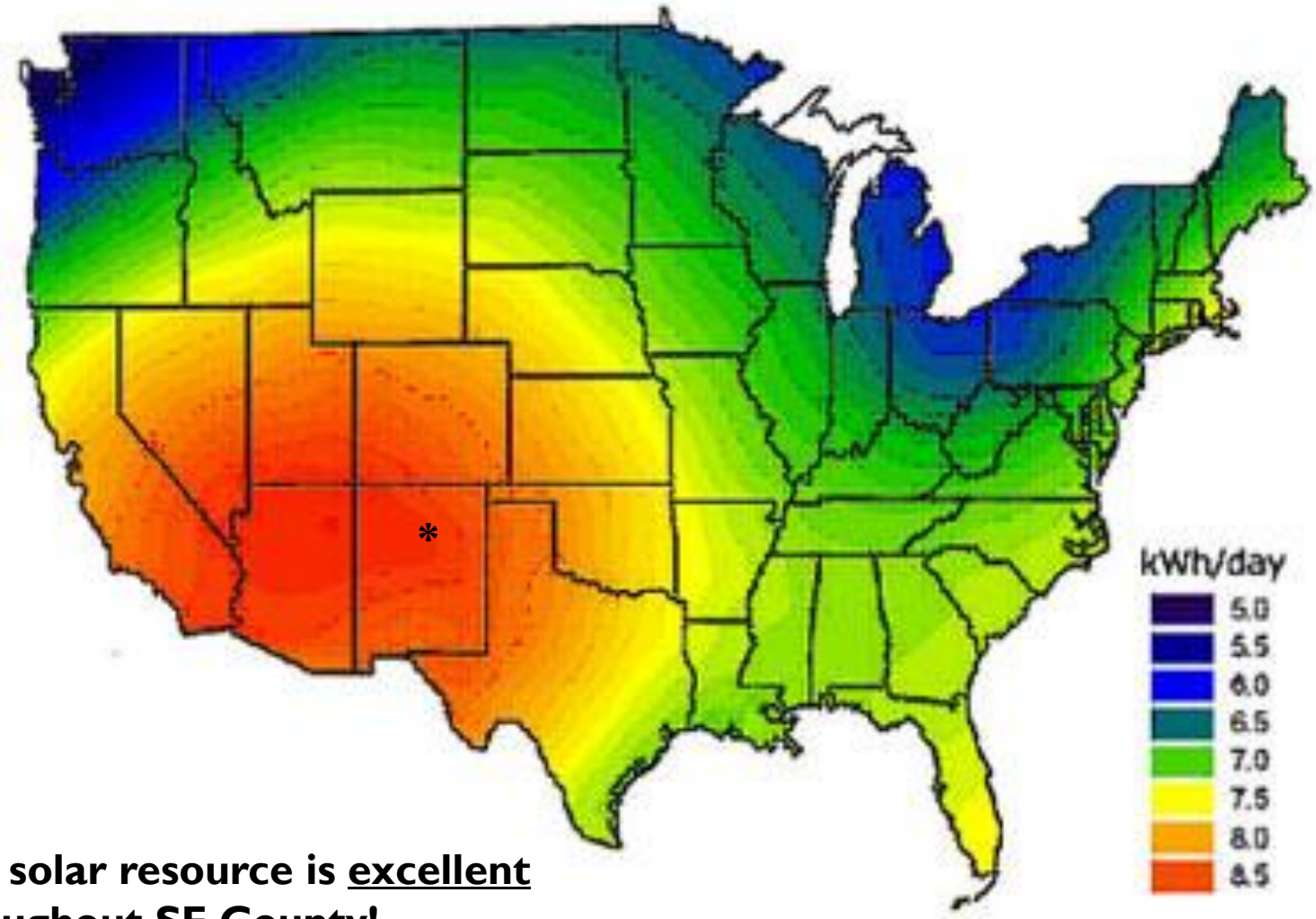
- **Renewable Energy Overview**
  - **Solar → electric "PV" and solar thermal**
  - **Small wind systems**

- **Financial Benefits to your Business of EE and RE**
  - **Solar Financing Considerations**
  - **Cost-benefit "payback" analyses**
  - **NM Gas Company EE Incentives**
- **Overview of Energy Efficiency Assessments and Improvements - Erik Aaboe**
- **PNM's Commercial Energy Efficiency Programs & Incentives – Carlos Lucero**
- **Q&A**

"Customer-Scale" Renewable Energy → Solar Power



NM: 2nd Best Solar Resource in the USA!!



Our solar resource is <u>excellent</u> throughout SF County!

Types of Solar Systems

- **Solar Electric Photovoltaics (PV)**
  - **Converts light (not heat) to electricity**
  - **Roof and ground mounted**
  - **On-grid and off-grid (need battery storage)**
  - **"Net Metering" – utility "pays" you the retail rate**
  - **Attached to roof or "ballasted" (weighted) systems**
  - **South-facing, 10-30 degree tilt from horizontal, avoid shading**
  - **10 kilowatt (kw) system generates ≈ 1100 kw-hours (kwh) per month**
  - **$5000-6500/kw installed *before* 40% tax credits and accelerated depreciation**

- **Solar Thermal**
  - **Water and Space Heating**
  - **Water heating → great for hotels and restaurants that heat a lot of water**

Solar Hot Water Panels

Jobs: PV Installations
Stimulate Our Local Economy!

Deciding on the Size of Your PV System

- What % of your annual electric usage do you want to be generated by your solar system? 50%? 100%? → Review your electric usage for an entire year.
- How much do you want to spend? Or how big of a "net" monthly loan payment (accounting for the reduction to your electric bill) are you willing to take on?
- Do you want your system to serve as a "price hedge" against future rate increases? PNM has raised rates >30% in the last 4 years.

Solar PV and Thermal Incentives

- 30% federal income tax credit
- 10% state income tax credit
- 5 year accelerated depreciation
- Exempt from paying state sales tax (GRT)
- PV Electric:
  - "Net Metering" – meter spins backward "paying" you, essentially, the retail rate you pay for electricity
  - 5¢/kwh additional "REC" payment. Likely to decrease next year. 8 year REC payment contract.
- Heating Water with Propane or Electricity? Solar thermal is an excellent choice!

Small-scale Wind Systems

- Wind resource varies throughout the County. Excellent in some locations. Best in open, rural areas lacking obstructions.
- County is drafting wind turbine permitting requirements. Will be soliciting public input! Systems are usually 50-90 feet high.
- Best to have one year of wind data before investing.
- Check with NM EMNRD, Energy Conservation and Mgt. Division's Wind Specialist

The 1,2,3s of Solar's (and EE's and other RE types') Financial Benefit

1. **<u>Immediate and Medium-term Benefit:</u> monthly reduction to your utility bills. L-term price hedge against rate increases. Ability to market your business as "green" and "renewable".**
2. **<u>Long-term Benefit:</u> PV systems keep generating electricity for 25+ years. Once your loan is paid off, your electricity is free, because the "fuel" is free!**
3. **<u>Long-term Benefit:</u> RE and EE increase the value of your commercial property.**

Costs, Pay-back, Financing

- 10.56 kw PV system: $52,000
- 40% tax credits: $20,800
- Net system cost: $31,200
- 5 Yr. Accelerated Depreciation Tax Savings: $12,870
- Final Net Cost: $18,330!
- Financing: Longer the term, the lower the payments.
- County working with lenders to offer special solar loan products

Electric Utility Bills: With and without a Solar PV System

Assumes a 3.78%/yr. electric rate increase

Energy Efficiency:
How much electricity do my appliances and plug loads use?

- See PNM's web site: http://www.pnm.com/customers/energy_calc
- Check out a "Kill-a-Watt" meter from your local library
  - Downtown branch
  - Southside branch
  - Eldorado
- Plug-loads: Phantom loads

Electric & Natural Gas Utility EE Incentives

- **NM Efficient Use of Energy Act requires utilities to have aggressive EE programs**
- **"Negawatts" are much less expensive than megawatts!**
- **EE can be acquired for 2-5¢/kwh vs. 10+¢/kwh for a new power plant http://www.pnm.com/rebates/business_rebates.htm?source=col4**
- **See PNM's "energy saving tips" web page.**

NM Gas Co. Incentives

- **High efficiency water heater rebates**
- **Restaurants –** Energy Star convection ovens, fryers and griddles. Low flow pre-rinse valves.
- **Commercial Solutions Program** - objective, no-cost consulting services to help businesses identify cost-effective EE projects, properly evaluate vendor proposals , and leverage the resulting energy savings and financial incentives
- **http://www.nmgco.com/Business-Energy_Efficiency.aspx**

Commercial Energy Efficiency

What is Energy?

- Energy is the capacity of a physical system to perform work
- Energy can be transformed but not created nor destroyed
- Energy flows from high concentrations to low concentrations
  - Heat flows to cold
  - Air moves from high pressure to low
  - Moisture moves from wet to dry

Units of Energy

- Heat is measured in BTUs (the amount of energy to heat 1 pound water 1 degree Fahrenheit)
  - There is about 1 BTU released in the complete combustion of a kitchen match
- Electricity
  - Electrical power measured in Watts
  - 1000 watts = 1 Kilowatt (kW)
  - Electrical energy measured in Kilowatt hours (kWh)
    - 1 kWh =
      - 100 watts for 10 hours
      - 25 watts for 40 hours
      - 1 watt for 1000 hours

Energy Content

- 1 kilowatt hour (kWh) equivalent to 3,412 BTU
- 1 gallon of propane contains 92,000 BTU
- 1 therm of natural gas (CCF) contains 100,000 BTU
- 1 cord of juniper contains 19,500,000 BTU
- How much of each is delivered in use? In other words, how efficient are the systems for each?
  - End use electricity close to 100%
  - Open flame combustion between 70% and 80%
  - Controlled combustion 92%-97%

How Much Gas Do We Use?

Transportation Services End-User Detail Page 1 of 1

Shipper: BP ENERGY COMPANY

Account Number: 000039809-0039809
Contract Number: T31800

End-User: SFC - ADMINISTRATION BUILDING

Bill Date	Account Number	Service Address
09-MAY-2011	041814209-1332434	102 GRANT AVE SANTA FE, NM

Service # 200 Gas

Meter # 0477876

Meter Reading	Meter Read Date	Days Billed	Meter Readings Present		Previous		Meter Constant		CCF Used		Conversion Factor		Therms
Actual	02-MAY-2011	31	95195	-	95026	X	1.837	=	310.453	X	0.806500	=	250.380

Trans T&D Gen Svc Sm Vol Rate 54 - GG1V

Surcharge	250.380 Therms @ $ 0.0009000-	$0.23-
Distribution	250.380 Therms @ $ 0.0648000	$16.22
Transmission	250.380 Therms @ $ 0.0648000	$16.22
Access Fee		$16.50
Gas Energy Efficiency Fee		$1.18
Pipeline Safety Fee		$0.16
Franchise Fee		$0.98
Total Current Gas Charges		**$51.03**

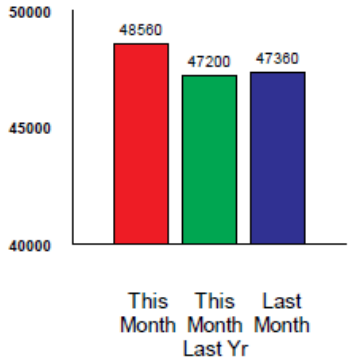
How Much Electricity?

COUNTY COURT HOUSE

Bill Date	Account Number	Service Address
05-MAR-2012		102 GRANT AVE SANTA FE, NM

Service # 100 Electric
Meter # 0619468

Meter Reading	Meter Read Date	Days Billed	Meter Readings Present		Meter Readings Previous		Meter Constant		kWh Used
Actual	29-FEB-2012	29	2174	-	1567	X	80.000	=	48560.000

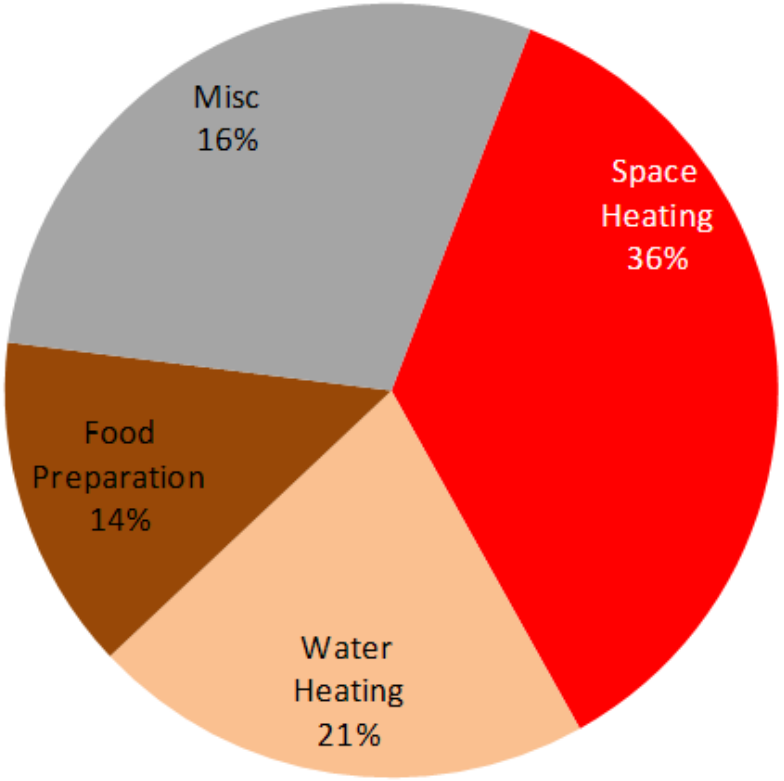


GRAPH DISPLAYED IN kWh
Average cost per day was $158.01
Average use per day was 1,674.48 kWh

Non-Res, General Power TOU - EN0K			
Off-Peak Use and Charge		24,320.000 kWh @ $ 0.0393037	$955.87
On-Peak Use and Charge		24,240.000 kWh @ $ 0.0699376	$1,695.29
Palo Verde Refinancing Credit		24,240.000 kWh @ $ 0.0000390 -	$0.95 -
Palo Verde Refinancing Credit		24,320.000 kWh @ $ 0.0000390 -	$0.95 -
Fuel Cost Adjustment		24,240.000 kWh @ $ 0.0035020	$84.89
Fuel Cost Adjustment		24,320.000 kWh @ $ 0.0035020	$85.17
Customer Charge (includes 1st 50 kW of billed demand)			$655.00
Demand Reading	1.490		
Actual Demand (Read x Constant)	119.200		
Billable Demand	119.200		
Billed demand and charge above 50 kW	69.200		$906.52
Cost-Effective Energy Saving Prog.			$111.84
Franchise Fee			$89.85
TOTAL KWH BILLED ON THIS SERVICE		48,560.000	
PERCENT OF KWH USED ONPEAK		49.91%	
Total Current Electric Charges			**$4,582.53**

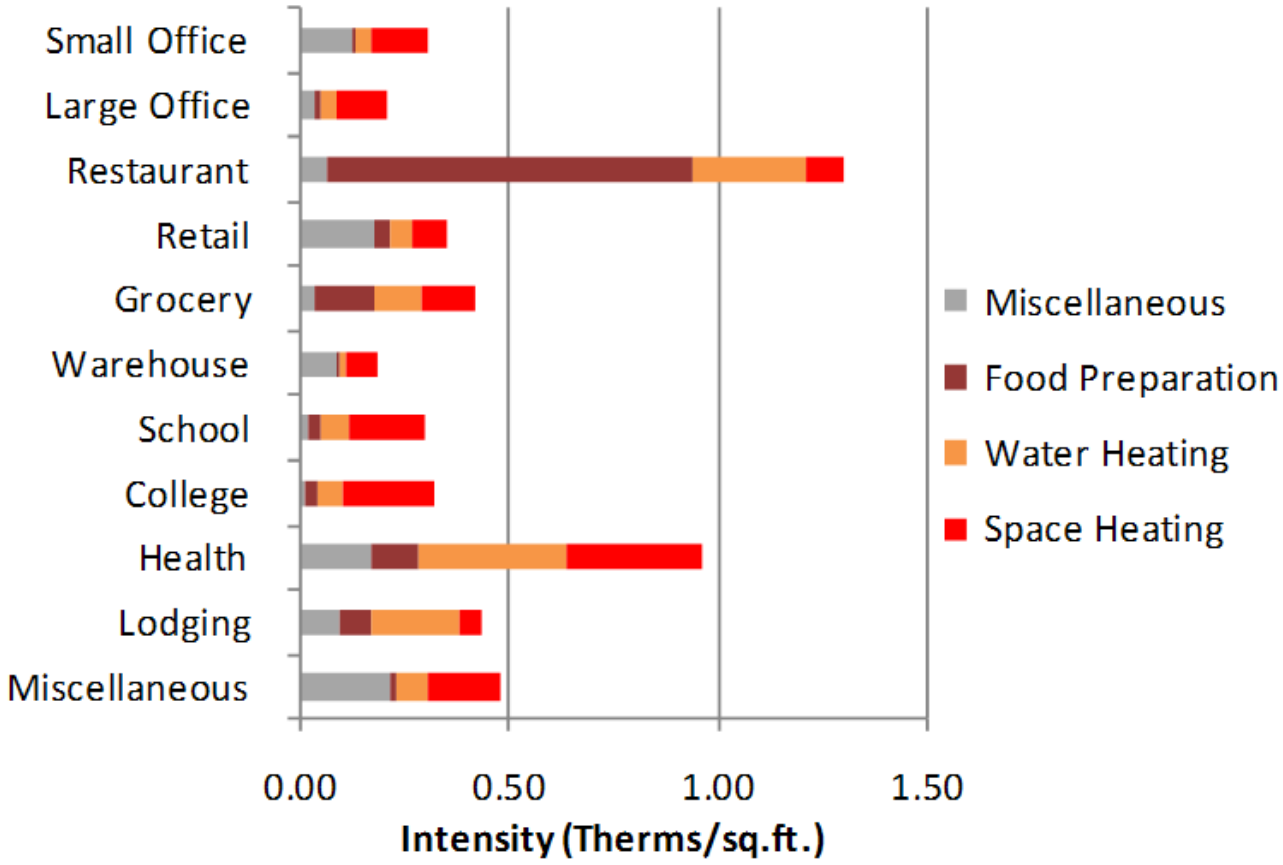
Commercial Gas Use in NM

Figure 3-5 Commercial Natural Gas Consumption by End Use, 2009



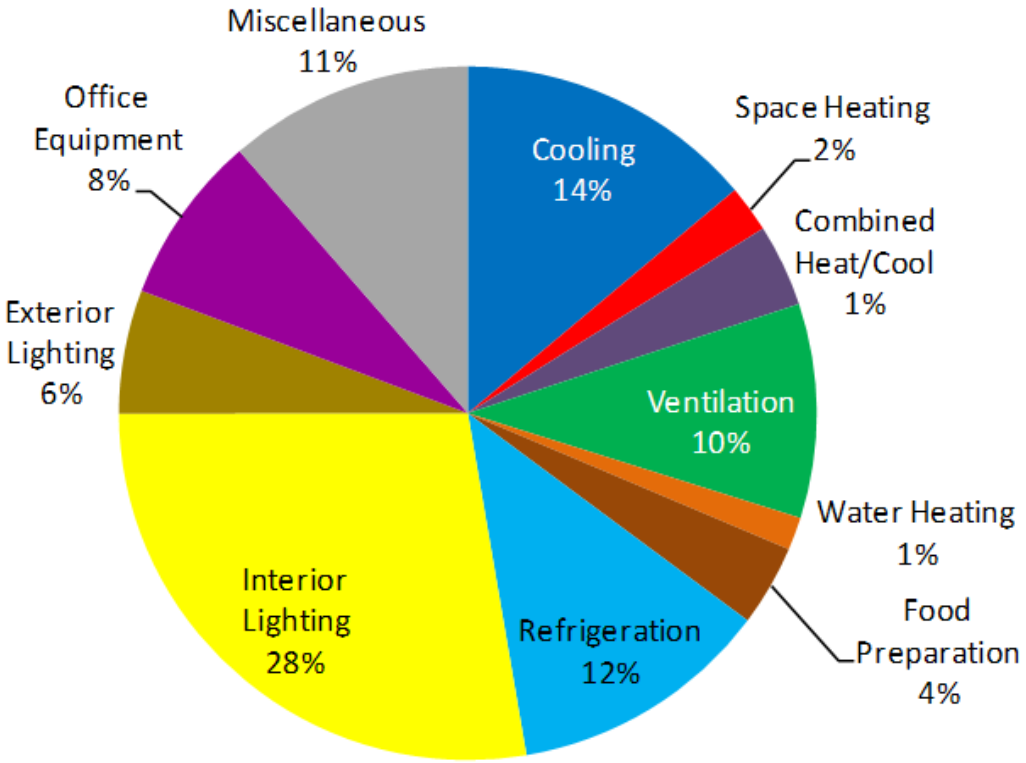
NM Commercial Gas Intensity

Figure 3-6 Commercial End Use Intensities by Building Type, 2009



NM Commercial Electricity Use

Figure 3-5 Commercial Electricity Consumption by End Use, 2009



Commercial Electricity Intensity

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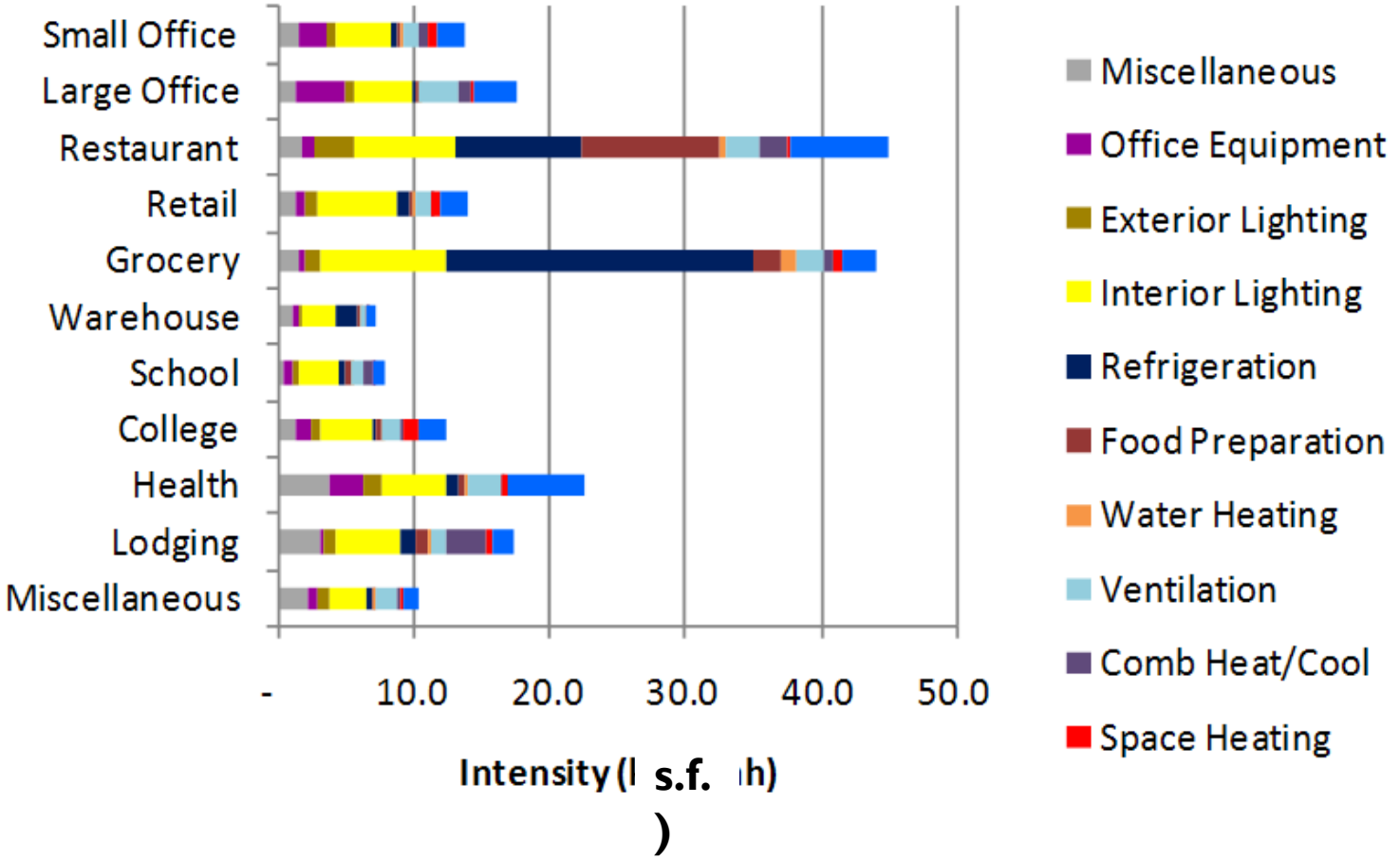

Energy Assessment / Audit

- Technical review of your energy use, comparison to benchmarks
- Examination of systems for
  - Lighting
  - Heating
  - Cooling
  - Refrigeration
  - Water Heating
  - Ventilation
- Preparation of Energy Savings Measures
  - Investment analysis that includes energy and maintenance savings, other benefits

Self - Assessment

- Review energy bills to determine your use relative to average buildings of the same type
- Is your energy using equipment off when not needed?
- Are heating and cooling set points different when unoccupied?
- Is your lighting up-to-date and adequate?
  - Would you get benefits other than energy savings?
  - Modern systems yield truer colors, improved visual acuity
- Preventive maintenance significant (filters, belt tightness, etc.)
- Do you need new heating / cooling / refrigeration systems?
  - Consider upgrading efficiency of equipment at that time
  - Examine life cycle cost of purchase / maintenance / operation to determine overall system cost

Available Resources

- "Benchmark" building with Energy STAR tools
- Review EPA's "Building Upgrade Manual"
  - Chapters on Lighting, Heating and Cooling, Investment Analysis, Financing
  - Detailed strategies for Grocery Stores, Hotels / Motels, Retail Stores
- Utility Rebate Programs
  - PNM's at http://www.pnm.com/rebates/
  - New Mexico Gas Company's at

https://www.nmgco.com/Business-Energy_Efficiency.aspx

Thank you!