

OVERVIEW OF THE SEATTLE COMMERCIAL BUILDING SAMPLE DESIGN

- * Research Objectives
- * Sampling Units and Measurement Strategies
- * Types of Buildings Included in the Sample
- * Geographical Scope of the Sample
- * Random Sample of Commercial Land Parcels
- * Pseudo-Random Pick of New Construction Projects

RESEARCH OBJECTIVES

1. Characterize hourly end-use consumption in existing buildings
2. Explain the observed variability in use
3. Improve methods for predicting end-use consumption
 - Conservation assessment
 - Load forecasting

TYPES OF BUILDINGS INCLUDED
IN THE SAMPLE

* Two separate studies:

Full population
Buildings built to Seattle
code

* Non - residential buildings
excluding industrial structures

* SIC classification of building
uses

4000 thru 9999
minus 6513

GEOGRAPHICAL SCOPE OF THE SAMPLE

- * Full population sample confined to SCL service area
- * New construction sample confined to Seattle city limits
- * Reasons for limited geographical scope:

- prior end-use research experience with SCL
- unique nature of Seattle energy code
- logistical complexity of the data collection
- availability of sample frame data

RANDOM SAMPLE OF COMMERCIAL
LAND PARCELS

- * Sampling frame : A list of all
commercial parcels in SCL service
area
- * Unit of Analysis : Primary building
on sampled parcels
- * Sampling procedure : Two stage
stratified random pick

FIRST STAGE PARCEL SAMPLE

- * Building type stratification
- * Strata defined by groups of SIC's which require similar functional types of space
- * SIC groups mapped into groups of Land Use Codes
- * Probability of selection proportional to share of regional electricity use

FIRST STAGE SAMPLING
PROPORTIONS

BUILDING TYPES	SAMPLE PROPORTIONS
WAREHOUSE	8.93%
DRY GOOD RETAIL	16.92%
GROCERY	9.14%
RESTAURANT	9.08%
OFFICE	20.37%
PRI/SECONDARY SCHOOLS	7.41%
UNIVERSITIES	3.77%
HOTEL/MOTEL	3.46%
HEALTH	5.50%
OTHER	4.64%
NOT ELSEWHERE CLASS.	10.77%
ALL TYPES	100.00%

SECONDARY DATA COLLECTION

FLOOR AREA, STORIES, AGE

- * 1052 parcels selected
- * Secondary data on floor area, number of stories and age assembled
- * Data collected from:
 - raw assessor data
 - building department
 - WSRB
- * Problems :
 - poor measures of age
 - multiple structure parcels

DRIVE-BY SURVEY

* Drive-by survey conducted for
675 sites

* Findings:

building type classification
wrong for approx. 30 %

age impossible to estimate
reliably

31 % of the parcels contained
more than one tenant, 4 % had
5 or more

26 % of the parcels contained
more than one building, 3 %
had 5 or more

SECOND STAGE SAMPLE STRATIFICATION

- * Initial attempt at size and age stratification
- * Abandoned due to problems with measures of age
- * Three size strata created for each building type
 - small
 - large
 - very large
- * Cases placed in random order within size strata
- * Probability of selection proportional to share of building type floor area

SMALL/LARGE STRATA

DEFINITIONS

BUILDING TYPES	LARGE/SMALL BREAKPOINT FLOOR AREA
WAREHOUSE	15,000
DRY GOOD RETAIL	20,000
GROCERY	7,000
RESTAURANT	6,000
OFFICE	10,000
PRI/SEC SCHOOLS	50,000
UNIVERSITIES	50,000
HOTEL/MOTEL	20,000
HEALTH	50,000
OTHER	5,000

SECOND STAGE SAMPLING

PROPORTIONS

BUILDING TYPES	PERCENT OF SAMPLE WITHIN SIZE STRATA		
	SMALL	LARGE	VLB
WAR	22%	68%	10%
DGR	59%	36%	5%
GRO	36%	64%	0%
RES	51%	49%	0%
OFF	39%	50%	11%
SCH	60%	25%	15%
UNI	67%	33%	0%
HTM	41%	40%	19%
HEA	47%	40%	13%
OTH	24%	76%	0%

FINAL SITE SELECTION
PROCESS

- * Contact building owner/
manager
- * Preliminary site assessment
- * Reject sites if:
 - owner will not allow
access
 - principal tenants will
not allow access
 - unsafe conditions
 - very confused end-uses
- * Replace with next site in
the same type/size strata,
in random order

SAMPLE OF POST-ENERGY CODE
CONSTRUCTION

- * Sampling frame : A list of all commercial projects which were given permits after code implementation
- * Unit of Analysis : A building associated with the project
- * Sampling procedure : Pseudo - random with judgement
- * Scope : Limited to five largest building types

CANDIDATES AND
TARGET SAMPLE QUOTAS

BUILDING TYPES	NUMBER AVAILABLE	TARGET QUOTA
WAREHOUSING	16	5
DRY GOOD RETAIL	13	5
GROCERY	5	5
RESTAURANT	9	5
OFFICE	33	10