

## BESA, CANADA'S SOLUTION TO THE USER INTERFACE

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HEAD, ENERGY DEVELOPMENT PROJECTS  
PUBLIC WORKS CANADA

BESA REPRESENTS A MAJOR SOFTWARE DEVELOPMENT UNDERTAKING BY PUBLIC WORKS CANADA- IT IS AN APPLIED RV INITIATIVE AIMED TO ASSIST ENGINEERS, ARCHITECTS, PROPERTY MANAGERS, BUILDING OWNERS AND

OPERATORS WITH THE DESIGN AND MANAGEMENT OF BOTH NEW AND EXISTING ENERGY EFFICIENT BUILDINGS IS A MODULARLY EXPANDABLE SOFTWARE SYSTEM DESIGNED TO RUN COST EFFECTIVELY ON INHOUSE PERSONAL COMPUTERS- IT WILL ADDRESS VARIOUS STAGES OF THE BUILDING DESIGN AND MANAGEMENT CYCLE

SUCH AS RETROFIT/AUDIT, COMMISSIONING AND OPERATION, AS WELL AS CONCEPT, DETAIL AND PRE DESIGN- BY FEATURING MANY TECHNICAL AND ECONOMIC CAPABILITIES THAT DO NOT PRESENTLY EXIST, BESA BUILDS ON AND ENHANCES PRESENT STATE-OF-THE-ART ENERGY ANALYSIS PROGRAMS-

THIS HOWEVER, IS NOT TO SAY THAT BESA IS JUST ANOTHER ENERGY ANALYSIS PROGRAM, FOR IN ADDITION

### BACKGROUND

PWC BEGAN USING ENERGY ANALYSIS PROGRAMS IN 1974/75 WITH A VIEW TO CONSERVING ENERGY IN ITS BUILDING STOCK. AT THAT TIME, PWC SUPPORTED THE MERIWETHER ENERGY SYSTEMS ANALYSIS (ESA) PROGRAM AND PROVIDED TRAINING ON ITS USE TO ENGINEERS ACROSS CANADA. THIS ACTION WAS PARTLY IN RESPONSE TO THE ENERGY CRISIS OF 1973 AND PARTLY BECAUSE COMPUTERS WERE BECOMING AN IMPORTANT TOOL IN HEATING AND COOLING LOAD CALCULATIONS. AS SOME OF YOU MAY KNOW, THE USE OF COMPUTERS IN THE DESIGN AND ANALYSIS OF BUILDING MECHANICAL AND ELECTRICAL SERVICES SYSTEMS WAS FIRST ACCEPTED BY THE CONSULTING INDUSTRY IN 1965.

SINCE THAT TIME OVER 100 ENERGY ANALYSIS PROGRAMS HAVE BEEN DEVELOPED BY BOTH THE PUBLIC AND PRIVATE SECTORS, EACH CAPABLE OF PERFORMING ANALYSIS OF THE BUILDING ENVELOPE, AND MECHANICAL AND ELECTRICAL SYSTEMS.

OUR FEEDBACK FROM INDUSTRY HAS SUGGESTED THAT CURRENTLY AVAILABLE PROGRAMS ARE NOT BEING USED TO THEIR FULL POTENTIAL DUE TO THE FACT THAT MANY PROGRAMS ARE DIFFICULT TO LEARN, TOO COMPLEX TO USE, POORLY SUPPORTED AND COSTLY TO RUN.

OTHER FACTORS, SUCH AS BLACK-BOX SYNDROME, AND SPECIFICITY OF PROGRAM(S) TO RUN ON A PARTICULAR BRAND OF COMPUTER HARDWARE HAVE FURTHER COMPOUNDED THE ISSUE.

TO AUTHENTICATE THIS FEEDBACK, PWC CONDUCTED A NATIONAL SURVEY ABOUT THREE YEARS AGO. THIS SURVEY BASICALLY CONFIRMED WHAT WE HAD BEEN HEARING THROUGH INFORMAL CHANNELS, AND ALSO INDICATED THAT ARCHITECTS ARE NOT USING ENERGY ANALYSIS PROGRAMS AT THE PRE AND CONCEPT STAGES BUILDING DESIGN.

OTHER KEY ISSUES WERE ALSO IDENTIFIED. THESE WERE:

- A DESIRE BY INDUSTRY FOR MODULAR PROGRAMS WHICH ARE USER FRIENDLY, LOW COST AND EASIER TO USE
- THE NEED FOR A RETROFIT/AUDIT TOOL
- A DEMAND FOR FULLY PORTABLE NON-PROPRIETARY SOFTWARE
- A DESIRE FOR TECHNICAL IMPROVEMENTS
- A NEED FOR PROGRAMS CAPABLE OF RUNNING ON MICROS, AND
- TRAINING AND SUPPORT WAS VIEWED TO BE A KEY ELEMENT IN THE SUCCESSFUL INTRODUCTION OF AN SOFTWARE PACKAGE.

IT IS SIGNIFICANT THAT AN OVERWHELMING REQUEST A RETROFIT/AUDIT TOOL WAS REGISTERED DURING THE SURVEY. THIS IS NOT SURPRISING BECAUSE WE ARE CONTINUOUSLY MAKING IMPROVEMENTS TO EXISTING BUILDINGS SO THAT THEY OPERATE ENERGY EFFICIENT AND COST EFFECTIVELY. IT HAS BEEN SUGGESTED THAT 90 - 95% OF THE BUILDINGS TO BE BUILT BY THE YEAR 2000 ARE ALREADY HERE. WE MUST THEREFORE SPEND GREATER PERCENTAGE OF OUR EFFORT ON TOOLS TO SATISFY THE RETROFIT/AUDIT NEED.

### DEVELOPING TRENDS

LET ME NOW TURN TO TRENDS DEVELOPING IN THE INDUSTRY. IN THE PAST DECADE COMPUTERS HAVE MADE A SIGNIFICANT IN-ROAD INTO OUR BUSINESS WORLD. THE QUESTION IS NOT WHETHER TO USE COMPUTERS BUT HOW AND WHEN. COMPUTERS OFFER ENORMOUS POWER AT OUR VERY FINGER TIPS, WHICH IF HARNESSSED EFFECTIVELY, WILL RENDER US MORE COMPETITIVE AS WELL AS BETTER INFORMED.

EVEN ARCHITECTS ARE FINDING THAT COMPUTERS OFFER GREATER FLEXIBILITY WHEN THEY ARE CONFIGURING A BUILDING TO MEET WITH THE FUNCTIONAL AND AESTHETIC CONSIDERATIONS OUTLINED BY THEIR CLIENTS. THIS WOULD SUGGEST THAT WITHIN A DECADE, MANY MORE ARCHITECTS WILL BE USING COMPUTERS, IN FACT SOME ARCHITECTS IN CANADA HAVE ALREADY AUTOMATED THEIR PRACTICES.

THIS DOES NOT SUGGEST THAT EVERYONE IN THIS ROOM SHOULD FOLLOW SUIT SIMPLY TO KEEP UP WITH THE JONES'. HOWEVER, IF YOU CONCENTRATE ON THIS SLIDE FOR A MINUTE, YOU WILL APPRECIATE WHY ONE MUST THINK ALONG THE LINES OF THE JONES'.

THE FACT THAT HARDWARE-SOFTWARE SYSTEM PRICES HAVE BEEN STEADILY DECLINING FOR THE PAST DECADE IN RELATION TO ENGINEERING AND ARCHITECTURAL FEES IS NOT NEW. HOWEVER, WHAT IS NEW IS THE CROSSOVER, AND THAT I AM AFRAID HAS ALREADY HAPPENED.

INDICATIONS ARE THAT IF SOFTWARE SYSTEMS CAN BE CAREFULLY DESIGNED WITH USER NEEDS UPMOST IN MIND, DESIGNERS WILL WANT TO USE THESE TOOLS.

FURTHER, AS BUILDINGS ARE BECOMING MORE AND MORE FUNCTIONALLY COMPLEX, IT IS IMPERATIVE THAT EVERYONE INVOLVED COORDINATE THEIR EFFORTS TO DESIGN AND MANAGE THESE BUILDINGS ENERGY EFFICIENTLY. THIS DEMANDS FAST AND ACCURATE COST BENEFIT ANALYSIS OF ENERGY CONSERVATION STRATEGIES IN BUILDINGS BEFORE IMPLEMENTING THEM IN THE DESIGN. GONE ARE THE DAYS WHEN ONE COULD AFFORD TO DO CALCULATIONS ON THE BACK OF THE ENVELOPE.

AT ISSUE HERE IS NOT CONSERVATION FOR THE SAKE OF CONSERVATION, BUT RATHER JUDICIOUS USE AND OPTIMIZATION OF BUILDING ENERGY. BUILDINGS ARE PUT TO CONSUME ENERGY AND PROVIDE COMFORT FOR THEIR OCCUPANTS. THAT IS THEIR PRIMARY FUNCTION.

#### APPROACH

PWC'S APPROACH HAS BEEN TO FIRST CLEARLY IDENTIFY USER NEEDS, AND THEN TO DEVELOP APPROPRIATE SOFTWARE PACKAGE(S) TO ADDRESS THOSE NEEDS.

TO CLEARLY IDENTIFY USER REQUIREMENTS, PWC CONDUCTED A SERIES OF USER REVIEW SYMPOSIA ACROSS THE COUNTRY IN MAY AND JUNE, 1984. THESE SYMPOSIA WERE ENDORSED BY: THE RAIC, ACEC, BOMA CANADA AND REIC.

OVER 400 PROFESSIONALS FROM THE BUILDING INDUSTRY ATTENDED NINE, ONE DAY, SYMPOSIA HELD IN MAJOR CENTRES THROUGHOUT CANADA. A REPORT ON THE SYMPOSIA HAS BEEN COMPLETED AND WIDELY DISTRIBUTED IN CANADA. I WILL GLADLY MAKE A COPY AVAILABLE TO YOU IF YOU LEAVE YOUR BUSINESS CARD OR NAME AND ADDRESS AT THE END OF THIS SESSION. THE REPORT INCLUDES SYMPOSIA HIGHLIGHTS, SPEAKERS NOTES AND SLIDES AND SUMMARY OF QUESTIONNAIRES. (DISTRIBUTION GRAPHS DERIVED FROM QUESTIONNAIRE HIGHLIGHTS). THE PARTICIPANTS HAVE IDENTIFIED SEVERAL NEEDS, WHICH ARE, IN RANDOM ORDER:

INTEGRATION WITH GRAPHIC I/O CAPABILITY

PORTABILITY AND AVAILABILITY ON MICROS

DATA BASES AND THEIR APPROPRIATENESS

INTEGRATION WITH BUILDING AUTOMATION SYSTEMS AND EMS

#### MANY TECHNICAL CAPABILITIES

RETROFIT TO BE THE TOP PRIORITY

PROGRAM TO BE IN SEVERAL VERSIONS AND TAILOR MADE TO SUIT VARIOUS DISCIPLINES AND DESIGN STAGES

PROGRAM TO BE MODULAR IN STRUCTURE, FLEXIBLE AND TRANSPARENT

USER FRIENDLY, LOW COST, FAST TURN-AROUND AND EASY TO LEARN AND OPERATE

RELIABLE LONG TERM SUPPORT BY PROGRAM DEVELOPERS

ESTABLISHMENT OF USER GROUPS

VALIDATION AND TESTING OF PROGRAMS

CAPITAL COST AND LIFE CYCLE COST ANALYSIS

DATA BASE TO HAVE REGIONAL VARIATIONS

INCLUSION OF THRESHOLD VALUES BASED ON BUILDING CODES, FIRE CODES, MEASURES FOR ENERGY CONSERVATION AND AIR QUALITY GUIDELINES

#### PARAMETRIC CAPABILITY TO ALLOW COMPARISON BETWEEN OPTIONS

DATA ENTRY TO FEATURE SCREEN FORMATTING AS WELL AS QUESTION/ANSWER TECHNIQUES

DOCUMENTATION TO BE COMPLETE AND EASY TO FOLLOW

TRAINING AND EDUCATION

OVERALL STRUCTURE TO INCLUDE

- CAPABILITY TO DAISY CHAIN DIFFERENT ZONES TOGETHER
- PROGRAMMATIC STAGE REQUIRES INFORMATION RELATIVE TO ZONING, MARKET CONDITIONS, FIRE AND BUILDING CODE DATA
- OPTION FOR A MAIN FRAME VERSION INSTALLED IN SERVICE BUREAUS
- SIMULATION OF BUILT-UP SYSTEMS AS MUCH AS POSSIBLE

#### ONGOING COORDINATION AND RESEARCH

- MORE RESEARCH ON LIFE CYCLE COSTING AND COSTING IN GENERAL
- MORE EMPHASIS ON RESEARCH AT ALGORITHM LEVEL
- NEED TO LOOK TO RESEARCH FOR RELIABILITY OR VALIDATION TO DEVELOP HIGH LEVEL OF USER CONFIDENCE

IN RECOGNITION OF THE NEEDS EXPRESSED AND OTHER INPUTS GATHERED THROUGH IN-HOUSE FEASIBILITY STUDIES, PWC HAS ADOPTED THE FOLLOWING STRATEGY:

- BESA WILL BE DIVIDED INTO FIVE MODULAR PACKAGES
- EACH PACKAGE WILL ADDRESS A SPECIFIC DESIGN STAGE AND A SPECIFIC USER GROUP
- EACH MODULE WILL BE CAPABLE OF OPERATING ON IN-HOUSE PERSONAL COMPUTERS
- RETROFIT PACKAGE HAS BEEN GIVEN TOP PRIORITY

CONCEPTUALLY, THE BESA ARCHITECTURE CAN BE DIVIDED INTO TWO PARTS: BESA CORE(S) AND BESA PRE AND POST PROCESSOR(S).

FOR EACH DESIGN MODULE, THE BESA CORE WILL HAVE A DATA BASE, SUB ROUTINES FOR THE CALCULATION OF LOADS, SYSTEMS, PLANT AND ECONOMIC MODELS AND PERTINENT STANDARD BUILDING AND WEATHER DATA SUCH AS:

- CONSTRUCTION ELEMENTS
- ZONE/SYSTEM OPERATING SCHEDULES
- EQUIPMENT CHARACTERISTICS AND PERFORMANCE STANDARDS

ALSO INCLUDED ARE PART LOAD PERFORMANCE CURVES, MODIFIED BIN/HOURLY WEATHER DATA AND DESIGN WEATHER CONDITIONS.

THE PRE AND POST PROCESSORS PERFORM THE FOLLOWING FUNCTIONS:

- PROMPTING OF INPUT DATA BY DESIGN STAGE AND BUILDING TYPE
  - EDITING/EVALUATION OF INPUT DATA
  - CONTROL/COMMUNICATION OF THE BESA CORE, AND
  - OUTPUT OF CALCULATED RESULTS (USER SPECIFIED)
1. THE PRE PROCESSOR PROMPTS THE USER IN A MENU/SCREEN CONTROL MODE. DEPENDING ON THE DESIGN STAGE, THE PROCESSOR REQUIRES INPUT FROM THE USER AND USES DEFAULT INFORMATION FROM THE DATA BASE. HOWEVER, SHOULD THE USER WISH TO CHANGE OR ADD TO ANY INFORMATION IN THE INPUT JOB FILE, THIS CAN BE DONE BY MODIFYING THE DEFAULT DATA AND/OR CREATING A NEW DATA FILE TO SUIT THE SITUATION AT HAND. BESA THEREFORE, AFFORDS COMPLETE FLEXIBILITY IN DETERMINING WHAT INFORMATION BASE TO CHOOSE FROM.
  2. THE PRE PROCESSOR VERIFIES EACH PARAMETER AS IT IS ENTERED, AND EITHER ACCEPTS THE INPUT, OR NOTES AN ERROR AND REQUEST NEW INPUT. RATHER THAN JUST NOTING THAT AN ERROR EXISTS, THE PROCESSOR STATES WHY, AND WHAT FORMS OF CORRECTION OR MODIFICATION ARE REQUIRED, GUIDING EVEN THE NOVICE OR INFREQUENT USER OF BESA THROUGH THE SESSION. THIS FUNCTION BECOMES MORE IMPORTANT AS THE LEVEL OF DETAIL

INCREASES.

3. ONCE THE JOB FILE IS READY IT IS SUBMITTED TO THE CALCULATION SUB-ROUTINES IN THE BESA CORE FOR EXECUTION.
4. WHEN THE PROGRAM IS EXECUTED, THE OUTPUT OF CALCULATED RESULTS IS AVAILABLE IN MULTI-COLOUR DISPLAYS TO THE USER BY A VARIETY OF MEANS, INCLUDING BUT NOT LIMITED TO, PRINTER HARD COPY OUTPUT, CRT VIDEO OUTPUT AND OPTIONAL GRAPHIC OUTPUT ON A PLOTTER. OUTPUT GENERATED CONSISTS OF TABLES, LINE/BAR/ BARREL/PIE GRAPHS. SUCH OUTPUT REPORTS ARE PRESENTED TO THE USER INSTEAD OF A LENGTHY PRINTOUT. THESE REPORTS ARE STRUCTURED IN HIERARCHICAL FORM ENABLING THE USER TO PAGE DOWN TO THE LEVEL OF DESIRED DETAIL. ALL OF THESE REPORTS ARE MENU DRIVEN AND USER SELECTABLE.

## RETROFIT MODULE

LET ME NOW TURN TO THE DESCRIPTION OF THE RETROFIT MODULE THAT WE ARE UNVEILING HERE TODAY.

THE MAIN COMPONENTS OF THE RETROFIT MODULE ARE PRE-AUDIT AND AUDIT ANALYSIS.

THE PRE-AUDIT COMPONENT ALLOWS THE USER TO ANALYZE PAST UTILITY BILLS AND TO PLOT MONTHLY ENERGY CONSUMPTION BY SOURCE FOR THE YEAR(S) SPECIFIED. IN ADDITION, IT COMPARES THE DATA TO AN OPTIMUM AVERAGE DERIVED FROM A DATABASE OF THE SAME BUILDING TYPE. BY COMPARING THE BUILDING TO A STANDARD AVERAGE, IT CAN BE QUICKLY DETERMINE WHETHER THE BUILDING IN QUESTION IS A CANDIDATE FOR FURTHER AUDIT ANALYSIS. THIS DETERMINATION IS MADE ON THE BASIS OF A VARIETY OF BUILDING PARAMETERS SUCH AS AGE, GROSS BUILDING AREA, LOCATION, ENERGY SOURCE AND ITS FUNCTIONAL USE. IF IT IS ESTABLISHED THAT A BUILDING IS A CANDIDATE FOR RETROFIT, AN AUDIT ANALYSIS MAY BE CARRIED OUT.

THE AUDIT ANALYSIS ROUTINE FIRST CREATES A BASE MODEL OF THE BUILDING FROM EXISTING PHYSICAL AND OPERATING DATA INPUT BY THE USER.

ELECTIVELY, BASED ON THE GENERATED MODEL, THE BUILDING'S ENERGY CONSUMPTION AND/OR EFFICIENCY MAY BE IMPROVED BY MODIFYING THE DATA PREVIOUSLY INPUT THROUGH ONE OF THE FOLLOWING OPTIONS:

### 1. USER SPECIFIED CHANGES

THIS OPTION ALLOWS USER-MODIFICATION OF ANY OR ALL OF THE BASE DATA'S INDIVIDUAL RECORDS. NEW RESULTS ARE GENERATED AUTOMATICALLY UPON EXIT FROM THIS ROUTINE, AND MAY BE VIEWED SEPARATELY OR IN CONJUNCTION WITH THE BASE MODEL.

## 2. USER SELECTED ENERGY CONSERVATION MEASURES (ECMs)

THERE ARE 59+ USER SELECTABLE ECMs AVAILABLE. ANY NUMBER OF THESE MEASURES MAY BE CHOSEN IN ORDER TO EVALUATE THEIR EFFECTIVENESS. THE PROGRAM EXECUTES EACH IN A CASCADING MANNER. EACH ECM'S PRIORITY IS ASSIGNED ON A COST BASIS. IN OTHER WORDS, THE LEAST COSTLY MEASURES ARE RUN FIRST. IN THIS WAY, ONLY THE INCREMENTAL SAVINGS OF EACH MEASURE ARE IDENTIFIED. THE ECM RUN GENERATES RESULTS IN TERMS OF ENERGY. THESE RESULTS MAY BE OBTAINED WITH OR WITHOUT THE BASE MODEL AND/OR USED AS PROGRAM DATA FOR FINANCIAL ANALYSIS OF ENERGY SAVINGS/PENALTIES.

THE FINANCIAL ANALYSIS OPTION OFFERS CHOICES TO DETERMINE INTERNAL RATE OF RETURN, SIMPLE PAYBACK AND BENEFIT COST ANALYSIS.

## 3. PARAMETRIC ANALYSIS

THIS OPTION ALLOWS EVALUATION OF THE EFFECT OF FOUR INCREMENTAL OR DECREMENTAL VALUES ON ANY ONE OF THE VARIABLES (E.G. COOLING TEMPERATURE, ROOF INSULATION, GLAZING AREA, ETC...). THERE ARE OVER A DOZEN VARIABLES FOR WHICH PARAMETRIC ANALYSIS CAN BE PERFORMED. THIS TYPE OF ANALYSIS ALLOWS A COMPARISON WITH THE BASE MODEL FOR THE PURPOSE OF OPTIMIZATION.

## PROGRAM FEATURES

1. ENERGY CALCULATIONS ARE BASED ON ASHRAE'S TC 4.7 SIMPLIFIED ENERGY ANALYSIS BIN METHOD WITH NUMEROUS SOPHISTICATED EXTENSIONS FOR MONTHLY BIN CALCULATIONS. THESE INCLUDE, SOLAR LOADS AS WELL AS STATE-OF-THE-ART SYSTEM SIMULATIONS. PEAK LOAD CALCULATIONS ARE CONDUCTED ON A MONTHLY/HOURLY BASIS NOT JUST FOR ZONE LOADS BUT ALSO FOR ALL SYSTEM LOADS BEING ANALYZED.
2. SECONDARY SYSTEMS AND PRIMARY PLANTS CONFIGURATIONS ARE SIMULATED THROUGH TWELVE MONTHS TO DETERMINE PART LOAD CONDITIONS FOR MONTHLY ENERGY CONSUMPTION BY USAGE AND FUEL TYPE AND MONTHLY DEMANDS. PEAK LOADS (ZONE AND SYSTEMS) AS WELL AS ALL EQUIPMENT SIZES ARE DETERMINED VIA HOURLY CALCULATIONS.
3. EQUIPMENT SIZES (CFMS, FANS, BOILERS, CHILLERS...) MAY BE EITHER PROGRAM OR USER-DEFINED. IN THE FORMER CASE, BESA WILL AUTOMATICALLY DETERMINE THE SIZE REQUIRED, AND IN THE LATTER, WILL MEASURE THE EFFECT OF OVERSIZING THROUGH PART LOAD CONDITIONS.

## 4. BESA ANALYZES A MULTITUDE OF SYSTEM TYPES AND CONTROLS INCLUDING, BUT NOT LIMITED TO:

- VARIABLE AIR VOLUME SYSTEMS
- CONSTANT VOLUME SYSTEMS
- CONSTANT VOLUME/VARIABLE TEMPERATURE SYSTEMS
- FAN COILS
- UNITARY SYSTEMS
- HEAT PUMPS (WATER LOOP, REVERSE CYCLE)
- CHILLER, BOILERS, DOUBLE BUNDLE CONDENSERS, STRAINER CYCLE, ETC.

## 5. UP TO FIVE DIFFERENT SECONDARY/UNITARY SYSTEMS AND TWENTY-FIVE DIFFERENT ZONES HAVING GLASS ON TEN DIFFERENT EXTERIOR SURFACES, CAN BE ANALYZED WITHIN ONE BUILDING MODEL. THE PROGRAM ALLOWS EACH PRIMARY PLANT TO SERVE ALL SECONDARY SYSTEMS. SECONDARY SYSTEMS MAY BE ARBITRARILY MIXED TO SUIT THE NEED (UNITARIES AND PLANT SYSTEMS). SYSTEM STARTING/ENDING HOURS CAN BE ARBITRARILY SET.

## 6. BESA EXECUTES EXTREMELY QUICKLY. LESS THAN THREE MINUTES ON AN IBM-XT WITH A FIVE ZONE/TWO SYSTEM MODEL.

## 7. USER SELECTABLE BUILDING CATEGORY (INCLUDES MOST BUILDING TYPES).

## 8. ON-LINE HELP AVAILABLE FOR EVERY SCREEN.

## 9. TWO MANUALS AVAILABLE

- GENERAL USER MANUAL
- TECHNICAL REFERENCE MANUAL

## 10. PROGRAM PROVIDED IN BOTH ENGLISH AND FRENCH.

## 11. METRIC OR IMPERIAL UNITS (USER SELECTABLE FOR INPUT AND OUTPUT INDEPENDENTLY).

## 12. THE STANDARD PROGRAM IS ISSUED WITH WEATHER DATA FOR TEN MAJOR CANADIAN CITIES. U.S. AND OVERSEAS WEATHER DATA ARE AVAILABLE AS AN OPTION.

## 13. SUBSTANTIAL DEFAULTING OPTIONS, TAKEN FROM WIDELY ACCEPTED SOURCES, SUCH AS ASHRAE.

## TESTING

DURING JULY AND THE EARLY PART OF AUGUST OF THIS YEAR, THE RETROFIT PROGRAM WAS THOROUGHLY PUT THROUGH ITS PACES.

WE ASKED A GROUP OF TWENTY INDEPENDENT PROFESSIONALS ACROSS THE COUNTRY FROM THE ARCHITECTURAL, ENGINEERING AND PROPERTY MANAGEMENT

DISCIPLINES TO TEST THE PROGRAM IN REAL-LIFE SITUATIONS.

THE PURPOSE OF THIS EXERCISE WAS TWO-FOLD, THE MOST OBVIOUS OF WHICH WAS TO DISCOVER ANY BUGS THAT MAY HAVE STILL BEEN PRESENT IN THE S/W AND TO CORRECT THESE. OUR SECOND OBJECTIVE WAS TO GAIN FEEDBACK FROM INDUSTRY REGARDING THE PROGRAMS PRACTICAL FUNCTIONALITY, AS WELL AS TO CONFIRM THAT THE PACKAGE PROPERLY ADDRESSES THE NEEDS OF OUR USERS.

ON BOTH OF THESE COUNTS, THE OUTCOME OF THE TEST WAS HIGHLY SUCCESSFUL AND GENERATED MUCH POSITIVE RESPONSE FROM THE PARTICIPANTS INVOLVED.

THIS MEANS THAT THE BESA PACKAGE TO BE COMMERCIALY RELEASED IN OCTOBER OF THIS YEAR, WILL BE A FULLY TESTED PROGRAM THAT YOU, THE USER, WILL BE COMFORTABLE WORKING WITH.

#### TRAINING AND SUPPORT

TRAINING AND BOTH CUSTOMER AND TECHNICAL SUPPORT WILL BE PROVIDED BY A SUITABLY PLACED PRIVATE SECTOR ORGANIZATION LICENSED TO CONDUCT SUCH ACTIVITIES IN CANADA, THE U.S. AND EUROPE.

CUSTOMER SUPPORT WILL INCLUDE, BUT WILL NOT NECESSARILY BE LIMITED TO, A HOT LINE SERVICE, AND THE DISTRIBUTION OF PROGRAM UPDATES, NEW VERSIONS AND INFORMATION BULLETINS.

TECHNICAL SUPPORT OF THE PROGRAM WILL COMPRISE ON-GOING MAINTENANCE AND DEVELOPMENT OF NEW FEATURES.

TRAINING WILL CONSIST OF USER ORIENTATION SEMINARS IN MAJOR COMMERCIAL CENTERS ACROSS NORTH AMERICA. AS WELL, TRAINING WILL BE PROVIDED ON A CONTINUOUS BASIS IN ONE OR TWO PERMANENT LOCATIONS IN NORTH AMERICA. BASED ON DEMAND FOR SUCH ACTIVITY, TRAINING AND SUPPORT MAY EVEN BE EXTENDED TO EUROPE AND OTHER REGIONS OF THE WORLD.

THE LICENCEE WILL CARRY OUT A CERTAIN AMOUNT OF PROMOTIONAL ACTIVITIES AND OFFER THE RETROFIT PROGRAM IN A VARIETY OF PACKAGING. AS A MINIMUM, USERS WILL BE ABLE TO OBTAIN A DEMO PACKAGE INCLUDING TRAINING, TRAINING ALONE, OR A COMPLETE PACKAGE.

PRODUCT DISTRIBUTION WILL ALSO BE HANDLED BY THE LICENCEE TO ENSURE PRODUCT QUALITY AND AVAILABILITY THROUGHOUT NORTH AMERICA AND EUROPE. DETAILS OF THE PRODUCT DISTRIBUTION AND AVAILABILITY WILL BE ANNOUNCED SHORTLY.

PRICING FOR THE PRODUCT PACKAGE WILL BE DETERMINED JOINTLY BY CANADA PATENT AND DEVELOPMENT LTD., AND THE LICENCEE. I CAN ASSURE YOU THAT IT WILL BE REASONABLY PRICED AS OUR OBJECTIVE IS TO MAXIMIZE COMMERCIAL EXPLOITATION OF THIS TECHNOLOGY.

#### ONGOING DEVELOPMENT

IT IS OUR INTENTION TO CARRY ON WITH THE ONGOING DEVELOPMENT OF THE REMAINING BESA MODULES AND SOFTWARE PACKAGES OVER THE NEXT 2-3 YEARS. THIS APPROACH ALLOWS US TO EVALUATE CURRENT PRODUCT RELEASES AND TO ENSURE THAT ANY FUTURE RELEASES ARE CONSISTENT WITH THE MARKET REALITIES OF THE DAY.