Energy Performance Certificate SW for Buildings

Building Energy Performance Certificate and Passport
Ukraine and Moldova case
EPC Software

**Introduction**

- In the course of an **EBRD Policy Dialogue Project** one important priority was focussing on designing an **EPC concept** and design & implement appropriate **EPC Software** for Calculation and Certification/Verification

- **E7** and **Quarto** jointly developed together with 2 Ukrainian Institutions (NDIBK and SAEE) the EPC Application covering calculation/certification

- SW architecture and design was based on **best practice research** among European SW providers in this field, ‘**straight-through-processing**’ approach

- **Co-operation** with National Institutes on Calculation and Certification responsibilities

- Define, Design, Develop, **Validate**, Testing and Training of the SW solution

- **Quality assurance** integrated in this software

- Ukrainian specialty was also integrated: **Energy Passport**

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**EPC SOFTWARE**

- Calculator/Evaluator registration
- Energy performance calculation
- Energy Performance Certificate
- Independent verification
- EPC in database
- Public view of EPC in database
General approach of EPC software

- **Implementation of whole process flow in one software application** ('straight-through-processing')
  - from user registration, EPC calculation, certification, verification until final storage in EPC database

- **Controlled access to everybody registered**
  - **Web browser** for manual entry of building data – no software download needed, certification for auditors
  - Structured interface for automated transmitting of building data optional by XML interface is optional

- **Transaction based fee for calculation** (optional)
  - No investment cost for software users, ‘SAAS’*

- **Quality assurance** integrated in the software
  - Validation of input values
  - Plausibility check of results
  - Independent verification: Random selection of Certificates – second assessment

*SAAS = SW as a Service*
Energy Performance Software Features in UA

- **Software supports Calculation of Energy Performance**
  - Taking into account all energy related buildings systems
  - Calculation defined in several European standards
  - Calculation Kernel developed by e7 and NDIBK, tested and validated

- **Main Software features** (as implemented in Ukraine):
  1. Calculates **Performance for Energy Passport** and issues EPassport doc (DBN 31 compliant), supports assessment of **Minimum Energy Performance requirements** (Step 1: net energy demand for heating and cooling)
  2. Calculates **Energy Performance Certificate** (DSTU A.2.2-12:2015 compliant) and
  3. Manages **Certification Process** for auditors inclusive plausibility check, random **Verification** and final issuance and storage in public **EP Certificate database** (managed by SAEE), manages auditors’ database

Overview of EN standards based on EPBD calculation approach
EPC Software
How to use Unique Calculation Kernel

Calculation Kernel

Based on UA standards and norms (implemented and maintained by NDIBK)

Unique, country-wide calculation kernel*, leaves no room for interpretation of formulas

No need for SW validation process

Option 1 manual entry

 controlled access (via web browser based end user interface)


 Registration at NDIBK – no minimum qualification needed, Purchase of Starter Kit – financial barrier to avoid misuse of the tool

 Option to integrate XML interface in design software applications (e.g. AutoCad, ArchiCad, …)

 Thus, convenient automated EP Calculation is possible for new buildings

Option 2 integrated in Design SW

Open to any software vendor, provider (architectural design software, energy performance calculation tools), fast processing

Transparent definition and publication of XML interface for transmitting of building data

* Can be used for both EP Certificates and Energy Passport
Energy Performance Software

Current EPC Application Architecture (NDIBK - SAEE)

- Registry of Calculation Users
- EP Calculation DSTU A.2.2-12:2015 compliant
- Payment for EP Calculation (optional)
- Registry for Energy Auditors
- Automatic plausibility check
- Certification of Calculation (EP Certificate)
- Independent verification of EP Certificate
- EP Certificate stored in (public) database
- Web Interface for public enquiry of stored EP Certificates
EPC Software
Example Interface for Users, Ease of Use
Definition of building envelope (Calculation Module)
EPC Software
Example Interface for Users
Display of calculation results – draft version of the EP Certificate
EPC - Quality Assurance in Ukraine

Best Practice EPC Quality Assurance in Ukraine

- **Qualified Experts Competence**
  - Minimum requirements for qualification of Auditors

- **Control of Qualified Experts**
  - Database of Auditors publicly available
  - Penalties for non-compliance

- **Energy Performance Certificate Issuing**
  - National standard for calculation procedure available
  - Nationwide unique calculation kernel *(no agreement yet)*

- **Energy Performance Certificate Quality Control**
  - SAEE in charge of Quality Control
  - Automatic validation of input values
  - Automatic plausibility check of results
  - Random verification of certificates – second assessment

- **Energy Performance Certificate Registry**
  - Database for Certificates and data of calculation
  - Public access to Certificates

Automated Plausibility Check of EPC Calculation

<table>
<thead>
<tr>
<th>Rule ID</th>
<th>Rule Description</th>
<th>Applicable</th>
<th>Rule Points</th>
<th>Points</th>
<th>Value</th>
<th>Multi Value</th>
<th>Range From</th>
<th>Range To</th>
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<tbody>
<tr>
<td>1.01</td>
<td>Length of building</td>
<td>Yes</td>
<td>1</td>
<td>10.000</td>
<td>No</td>
<td>2</td>
<td>2</td>
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<td>1.02</td>
<td>Width of building</td>
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<td>1</td>
<td>8.000</td>
<td>No</td>
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<td>1.03</td>
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<td>1</td>
<td>80.000</td>
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<td>1.04</td>
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<td>1</td>
<td>2.600</td>
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<td>2.2</td>
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<td>1.05</td>
<td>Heat transfer coefficient U</td>
<td>Yes</td>
<td>1</td>
<td>0</td>
<td>-</td>
<td>Yes</td>
<td>(3 Violations)</td>
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<td>1.06</td>
<td>G Values of windows</td>
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<td>-</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
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<td>1.07</td>
<td>Share of window frame area</td>
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<td>1.08</td>
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<td>1.09</td>
<td>Temperature of hot water</td>
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<td>60.000</td>
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<td>No</td>
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Certificate - SW Demo [0~006]

Project Name: SW Demo [0~006]
Status: Requested
Rating: Yellow
Assigned Auditor: AT01
Construction Year: 2016
Building Purpose: Houses for one family
Building Compactness Index: 0.698
Building Facade Glazing Coefficient: 0.075
EPC - Quality Assurance in Ukraine

Public EPC Database – web based search capability
Backup Foils
EPC-SW Application Architecture

Central Databases

Calculation Engine
EPBD compatible, based on M.01.02:2016

Common Functions Module
User Management
Access Control
Reporting
Import/Export
etc.....

Calculation Users Module
Calculating the EP-Certificate

Evaluator Users Module
(Certification/Verification)
Inspection Report Generation

Public Users Module
(Access to Certificates)

Administration Users Module
(Calculation and Certification)

Browser Calculator
Chrome, IE, Firefox, Safari

Browser Evaluator/Verifier Inspector
Chrome, IE, Firefox, Safari

Browser Public Users Module
Access to Certificates
Chrome, IE, Firefox, Safari

Computing Center (state controlled entity, 1 server, professional system management)

World Wide Web

Michael Toth, Gerhard Hofer, November 2017

e7 Energie Markt Analyse GmbH
PAEE develops, jointly with the **CCA, National Information System** on Energy Efficiency of Buildings

**Calculation Application** defined by **CCA**

- **Calculation Kernel** EPBD compatible
- **Calculation Engine** Unique Kernel, Formulas, Tables
- Input of building geometry and elements
- Workspace for EPC Calculators
- **Calculation Results**, Interim Results
- **XML-Interface** for automatised import of building data

**Certification Application** defined by **PAEE**

- **Certification / Verification**
  - Plausibility Check of Input Data
  - **Workspace** for Evaluators’ Certification Requests
  - EPC Database incl. public access
  - **Random Selection** for Verification
  - Verification Processing
  - **Certificate Issuance**

- **Inspection** Report Generation

**Calculation Application Administration & User (Calculators) Management by CCA**

**Certification Application Administration & User (Auditors) Management by PAEE**

One centralised Web Server managed by PAEE, System Management, Operation, Maintenance, Security

**Ministry of Economy and Infrastructure – IT-platform**