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Energy Performance Certificate SW for Buildings

Buiding 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**

EPC
SOFTWARE

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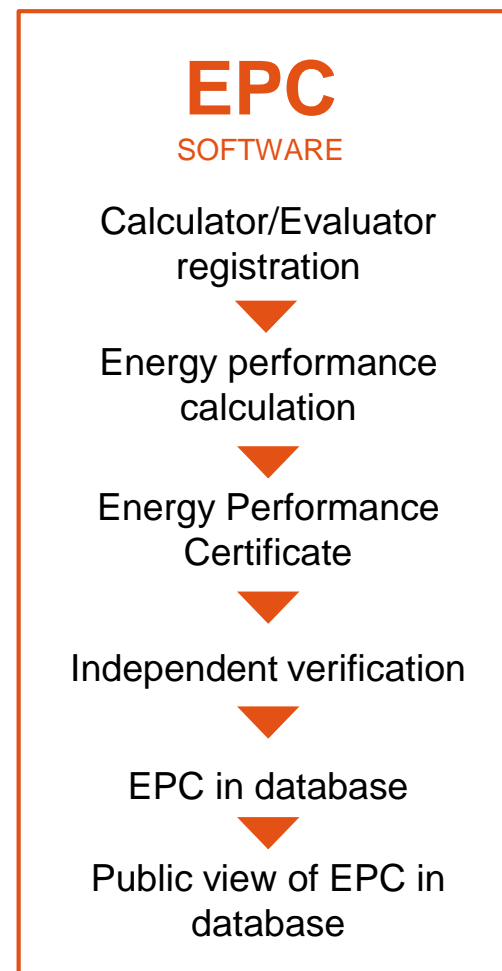▼
EPC in database
▼
Public view of EPC in database
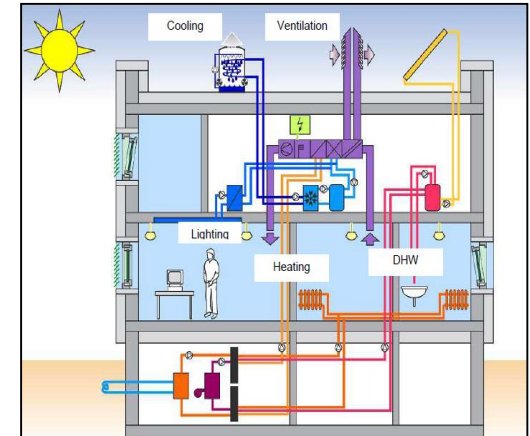
EPC Software
General approach of EPC software

- 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

EPC
SOFTWARE

Calculator/Evaluator registration

▼

Energy performance calculation

▼

Energy Performance Certificate

▼

Independent verification

▼

EPC in database

▼

Public view of EPC in database

* 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
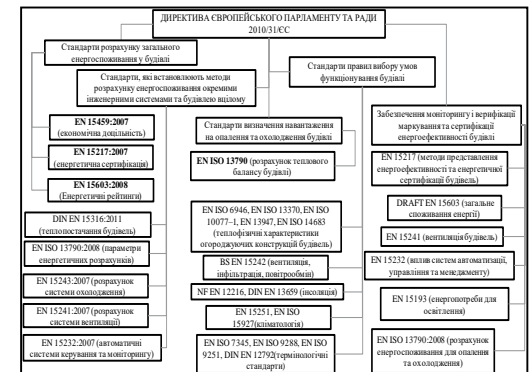
EPC Software
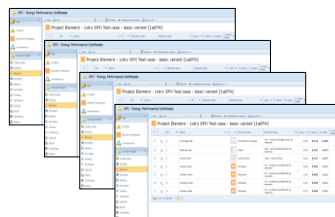# How to use Unique Calculation Kernel

Calculation Kernel

Based on UA standards and norms (implemented and maintained by NDIBK)
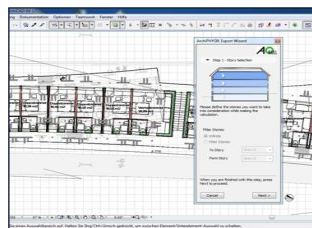
Unique, country-wide calculation kernel*, leaves **no room for interpretation** of formulas

No need for SW **validation** process

Option 1 manual entry

Option 2 **integrated in Design SW**

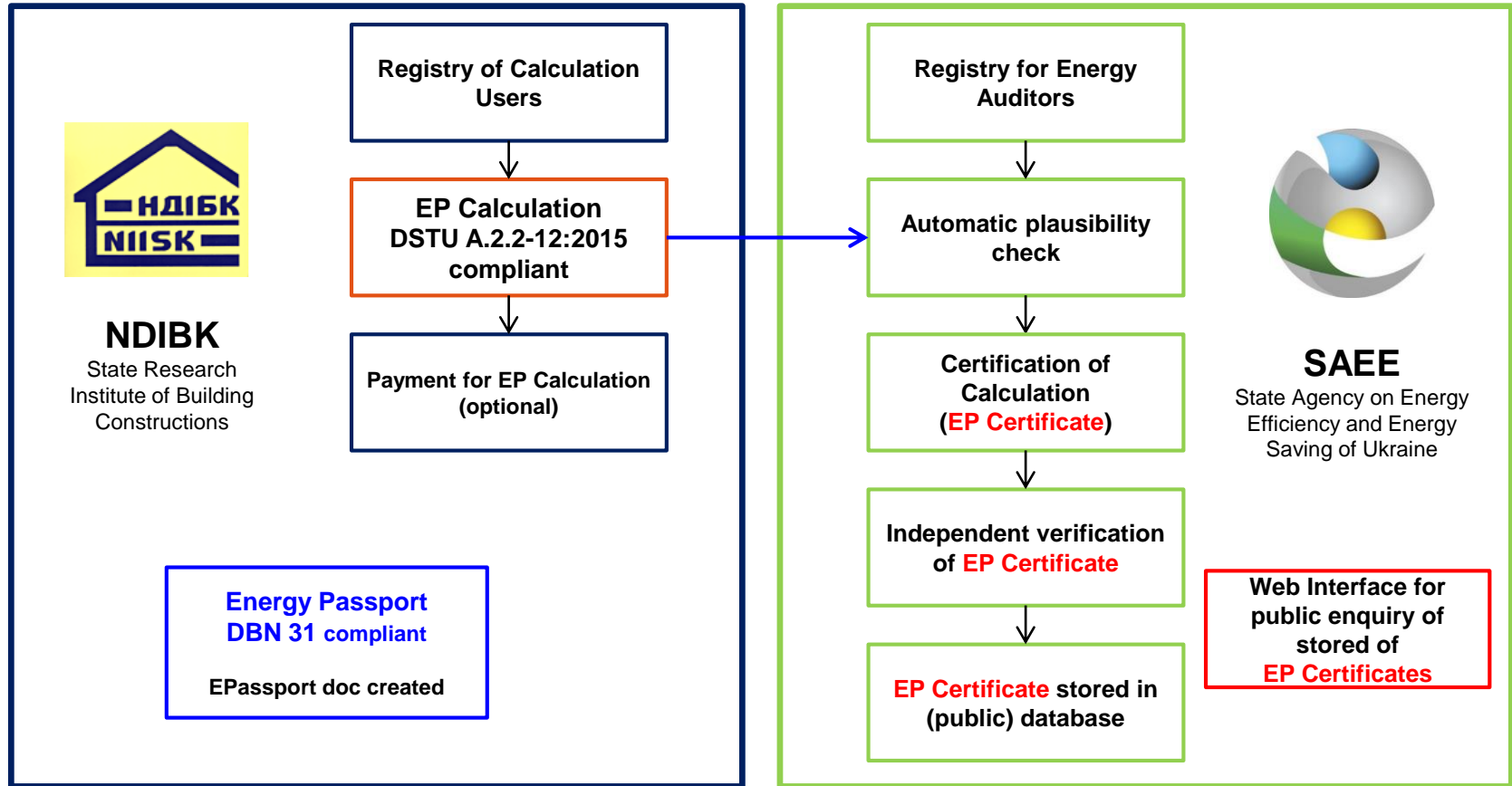***** Can be used for both EP Certificates and Energy Passport

- **Controlled access (via web browser** based end user interface**)**

- **Manual** entry of building data - Calculation of Energy Performance Certificate by means of **Unique Calculation Kernel**

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

- **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

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

- Thus, convenient automated EP Calculation is possible for new buildings

Energy Performance Software

Current EPC Application Architecture (NDIBK - SAEE)

NDIBK
State Research Institute of Building Constructions

Registry of Calculation Users

EP Calculation
DSTU A.2.2-12:2015 compliant

Payment for EP Calculation (optional)

**Energy Passport
DBN 31 compliant**

EPassport doc created

Registry for Energy Auditors

Automatic plausibility check

Certification of Calculation
(**EP Certificate**)

Independent verification of **EP Certificate**

EP Certificate stored in (public) database

SAEE
State Agency on Energy Efficiency and Energy Saving of Ukraine

**Web Interface for public enquiry of stored of
EP Certificates**

EPC Software
Example Interface for Users, Ease of Use
Definition of building envelope (Calculation Module)

EPC - Energy Performance Certificates

Copy | Delete | Add | Refresh | Validate this section | Export to ▼

🏠 Envelope Item - 9stry residential building [001]

		El. No	Name	-	Type	Area	Win./D.	Orientation	U-Value	R-Value
Element: Combined coverage (Count=1)										
☐		2	Roof		Cci - comb-coverage cond. by external	461,80	0		0,190	5,263
Element: Ground floor (Count=1)										
☐		1	Ground Floor		GFig - Ground floor	461,80	0		0,270	3,704
Element: Walls (Count=6)										
☐		3	Wall		EWi - wall conditioned by the external	801,00	0	W	0,303	3,300
☐		3	Wall		EWi - wall conditioned by the external	691,30	0	E	0,303	3,300
☐		3	Wall		EWi - wall conditioned by the external	801,00	0	N	0,303	3,300
☐		3	Wall		EWi - wall conditioned by the external	87,30	0	SE	0,303	3,300
☐		3	Wall		EWi - wall conditioned by the external	87,30	0	NE	0,303	3,300
☐		3	Wall		EWi - wall conditioned by the external	472,20	0	S	0,303	3,300
Element: Windows (Count=4)										
☐		5	Large Window		Wi - windows conditioned by external	178,20	100	E	1,330	0,752
☐		6	Large Window 2		Wi - windows conditioned by external	180,60	50	W	1,330	0,752
☐		4	Small Window		Wi - windows conditioned by external	36,00	20	NE	1,330	0,752
☐		4	Small Window		Wi - windows conditioned by external	36,00	20	SW	1,330	0,752

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Sidebar navigation: Main — Projects, Element Templates, Comparisons; Current Project — Project Data, Building, Element, Envelope, Heating, Hot Water, Cooling, Ventilation, Lighting, Result, Certificate, History, (Debug); Credits & Purchases; Background Info; Admin

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
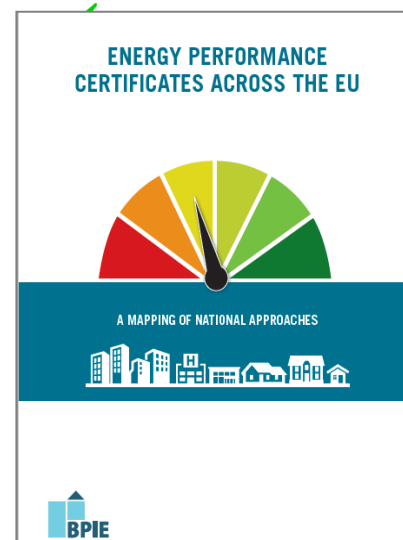
Energy Performance Certificate Issuing

- 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

ENERGY PERFORMANCE CERTIFICATES ACROSS THE EU

A MAPPING OF NATIONAL APPROACHES

BPIE

Source: BPIE, Energy Performance Certificate Across The EU, A Mapping of National Approaches, 2014

EPC - Quality Assurance in Ukraine
Automised Plausibility Check of EPC Calculation

EPC - Quality Assurance in Ukraine

Public EPC Database – web based search capability
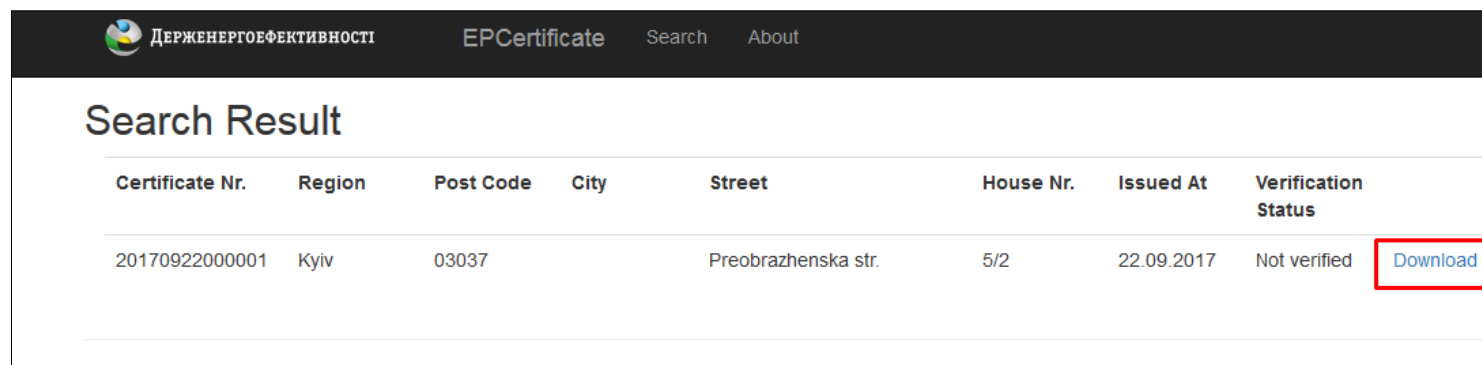
Backup Foils

EPC-SW Application Architecture

Central Databases

Common Functions Module

User Management

Access Control

Reporting

Import/Export

etc…..

Calculation Engine

EPBD compatible, based on M.01.02:2016

Calculation Users Module Calculating the EP-Certificate

EvaluatorUsers 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/Verifyer Inspector
Chrome, IE, Firefox, Safari

Browser
Chrome, IE, Firefox, Safari

Browser
Chrome, IE, Firefox, Safari

MS Windows Server, Microsoft .NET Framework
Microsoft SQL Server, Internet Information Server

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

Web-based PORTAL

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

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

CCA controlled access

Web-based PORTAL

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

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

PAEE controlled access

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

Ministry of Economy and Infrastructure – IT-platform

Michael Toth, Gerhard Hofer, November 2017
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