Abstract - The dynamic changes of the competitive energy market requires the reconfiguration of current design of energy objectives into a new vision dictated by the “Project Management” shaped according to the concept of operational research required by the sustainable development of systems subject to renewal. In this vision the present paper addresses two issues, namely, building up the revenue-cost budget based on the growth of the effect generated by each designer who applies in practice the convergent engineering and the presentation of the new methods of calculation of the efforts necessary to achieve without risk the domestic energy objectives compared with the international ones.

1. SAMPLE FORMULATION AND GOAL OF THE APPROACH TO THE DEVELOPMENT OF THE BUDGET AT THE LEVEL OF ISPE

The revenue and cost budget at the level of energy objectives design taking into account the particularities of ISPE may be conducted in two distinct variants, namely.

V₁ = Variant based on primary elements and calculation elements of expenses and revenues.

V₂ = Variant based on the elements of operational research that allows the quantification of revenues and expenses starting from the mathematics of the real fact.

The first budget variant operates with the value efforts that allow to cover the general activities, the activities called direct and indirect activities, including the different and unexpected activities.

A second option calls for all the real events that occur frequently in the design process of ISPE and allows the quantification of revenues and expenses starting from the mathematics of the real fact.

2. MODELING EFFORTS AND EFFECTS

2.1. General structural model of the A.S.E. type

a) revenue estimate models

\[ V_{total} = V_{internal} + \sum_{j=1}^{n} \text{price internal products} \]  
\[ + \sum_{j=1}^{m} \text{price internal products} \]  

\[ P_{internal} = c_{internal cost} + t_{internal taxes} + p_{internal profit} \]  

\[ P_{external} = c_{external cost} + t_{external profit} \]  

\[ V_{total} = V_{total costs} + P_{realized costs} \]

b) Models for quantifying the costs

\[ C_{total} = [C_{material} + C_{labor} + C_{other unforeseen costs}] \]  

\[ C_{material} = [C_{consumables} + C_{energy} + C_{depreciation} + C_{service} + C_{transport} + C_{telephone} + C_{post} + C_{protocol} + C_{advertising and publicity} \]  

\[ + C_{guard} + C_{extra} ] \]  

\[ C_{labor} = [C_{salaries} + C_{ins} + C_{unemployment} + C_{health} + C_{accidents} + C_{labor chamber} + C_{other cost} ] \]  

C) Profit planet and carried out

\[ P_{programmed profit} = \begin{bmatrix} V_{total} \text{ programmed } - C_{total} \text{ programmed } \end{bmatrix} \]  

\[ P_{realized profit} = \begin{bmatrix} V_{total} \text{ realized } - C_{total} \text{ realized } \end{bmatrix} \]

After this system of drawing up the budget the costs are divided into four categories, namely general costs, direct costs, indirect costs and unforeseen expenses.

The budget built on structure of these expenses is inconsistent, does not cover the total cost, whereas a suite of new activities dictated by the formation of new methodologies for building budgets are omitted from the quantification of the final costs.

In calculating project costs and the traditional design units ones we can use two classes of models, namely.

1. Models based on primary elements
2. Models based on calculation elements

\[
C_{\text{total expenses}} = C_{\text{direct materials}} + C_{\text{salary for productive personnel}} + C_{\text{ground and building tax}} + C_{\text{miscellaneous and unforeseen}}
\]

The methods for determining the final price on performed activities and for achieved projects are mainly the following: the normative method, the standard-cost method, the cost-computer hour method the direct-cost method. These methods apply both to quantify the current activities and for forecasting the direct design forecast cost. It would be useful for the anticipatory cost methods to be the subject of a comprehensive study at the level of ISPE.

2.2. Operational research models structured on real events

The new structure model for calculating the revenue-cost budget measured in operational research are the following calculating configurations:

a) Models for calculating the updated total and annual income

\[
\begin{align*}
\text{Updated} & = (1 + r) \cdot C_{\text{updated}} + P_{\text{profit}} \\
\text{Annual} & = (1 + r) \cdot C_{\text{annual}} + P_{\text{profit}}
\end{align*}
\]

b) Models for calculating the total updated cost and the annual ones in operational research

\[
C_{\text{cost}} = \sum_{i=1}^{n} (1 + r_2) \cdot C_{\text{annual}} ; \quad r_2 = \left[ r_d + r_3 + r_4 \right]
\]

where:
- \( r_2 \) = updated rate, which indicates a decrease in time of the value of money consists of the interest rate (\( r_d \)), the inflation rate (\( r_3 \)) and the risk rate (\( r_4 \)).
- \( C_{\text{annual}} \) = Total annual costs expressed in terms of efforts needed to achieve real events.

The models to estimate the annual expenses in operational research can be synthetically presented as follows:

\[
\begin{align*}
C_{\text{total annual}} & = \left[ C_{\text{annual}} + C_{\text{direct materials}} + C_{\text{salary for productive personnel}} + C_{\text{miscellaneous and unforeseen}} \right] \\
C_{\text{profit}} & = \left[ C_{\text{profit}} + C_{\text{loss}} \right]
\end{align*}
\]

The models for calculating cost on real detailed events have the following mathematical structures:

\[
C_{\text{cost}} = C_{\text{annual}} + C_{\text{updated}} + C_{\text{miscellaneous and unforeseen}}
\]

where:
- \( p_{ei} \) = price of power at national level (lei/ kWh), \( t_e \) = operating time of the system; \( p_{es} \) = price of the not delivered power equal to 200 Pei; \( E_{\text{not delivered}} \) = not delivered power; \( i_{sp} \) = the specific investment to restore the installation destroyed by the aggressive risks; \( P_{\text{av}} \) = power on failure.
If the failure power is \((0.25 \, P_c)\), the system should be prepared with sums of taking over the risk. If the power \((P_{av} = P)\) then the system undergoes the catastrophe phase, which can deteriorate into chaos when \((P_{av} = P)\). The other expenses of the new model called commercial efforts have in their structure the following calculation relations:

\[
C_{\text{materials + fuel + energy}} = \sum_{i=1}^{n} M_i \text{price of each material} + \sum_{j=1}^{m} B_j p_j + \sum_{r=1}^{l} E_r p_r
\]

where \(B_j = \text{types of purchased fuel}; p_j = \text{the differential price of the purchased fuel in the conditions of the circumstantial market favourable to the purchaser}; E_r = \text{purchased power}; p_r = \text{power tariff}.

The cost on the reduction of expectations is calculated as follows:

\[
C_{\text{decreased wait}} = C_{\text{for new methods of labor applied with delay}} + C_{\text{increasing human contribution (passing from two hours of actual labor to eight hours as provided by law)}}
\]

Production costs are determined by means of the following operational models:

\[
C_{\text{innovation technologies and working methods}} = C_{\text{reengineering design and operational objectives}} + C_{\text{improved working methods}}
\]

\[
C_{\text{optimal operation state of analysed system}} = C_{\text{loading workplaces with loads up to 80% of capacity}} + C_{\text{maintenance and repairs}} + C_{\text{depreciation}} + C_{\text{endowing workplaces with efficient information systems}}
\]

\[
C_{\text{quality}} = C_{\text{designing quality}} + C_{\text{removing nonconformity}}
\]

\[
C_{\text{designing quality}} = C_{\text{cost elaboration of managerial quality manual}} + C_{\text{cost increased quality by designing and processes}} + C_{\text{cost nontrainig personnel from quality perspective}} + C_{\text{cost risks billing errors-related penalties + decision nonconformable with reality}} + C_{\text{cost client inquiries}}
\]

\[
C_{\text{nonquality}} = C_{\text{cost inefficient decision making}} + C_{\text{cost implementation}} + C_{\text{cost maintenance}} + C_{\text{cost client inquiries}}
\]

The costs of intensive learning and the ergonomic ones are determined considering that every three years the entire human resource body reconfigures professionally. The costs of the significant economic and financial activities which are found in the actual design processes are calculated as follows:

\[
C_{\text{formation funds}} = C_{\text{increasing salary production in dynamics}} + C_{\text{ensuring increased salaries in own funds}} + C_{\text{quickker increase of productivity than initial provisions}}
\]

The management indicators that enable the application of this approach with a view of making up own funds have the following mathematical structures:

\[
i_{p_{production}} = \frac{i_{\text{realized production 2007}}}{i_{\text{realized production 2006}}} > i_{N_{\text{employees}}}; i_{p_{\text{labor productivity}} = \frac{i_{\text{labor productivity 2007}}}{i_{\text{labor productivity 2006}}} > i_{\text{average salary}} = \frac{\text{average salary 2007}}{\text{average salary 2006}}
\]

Hence: \(i_p > i_{sf} > i_{\text{NA}} > i_{p_{n}} > i_{sm}\) = differences enabling the creation of the funds of the examined units.

The costs for the design of the prices of the designed products are determined by the relations:

\[
p_{\text{price}} = \frac{C_{\text{total}}}{g_{\text{N}} \cdot p_{\text{price}}} + p_{\text{int external}} + p_{\text{int internal}} \cdot p_{\text{price}} I_{\text{export products}}
\]

The costs for the office equipment and new information systems are calculated as follows:

\[
C_{\text{biotics new information systems}} = (0.1 + 0.15)C_{\text{inti/ year}}
\]

Costs for the decision making and communication are calculated by the operative relations of the form:

\[
C_{\text{training efficient decision makers}} = \frac{i_{\text{reducing convergent engineering}}} {i_{\text{reducing convergent engineering}} + C_{\text{preparing a manager}}}
\]

\[
C_{\text{designing decisions}} = C_{\text{cost choosing optimal decision variant}} + C_{\text{costs applying final decision}}
\]
The cost on decisions design can be differential depending on the models used in the formation of the solution for the development of real activities, namely: spending on decisions based on economic-engineering efforts as resulted from the above, decisions based on significant effects called of resources savings and decisions based on information entropy, which quantifies the effects of disturbances injected into the analyzed systems.

The application in practice of these new models for quantification the efforts based on operational research is different from design to operation, whereas the restrictions involved are not competing. The setting of the structure of the annual and multi-annual budget based on cost determined in operational research design allows overcoming crisis situations dictated by lack of funds.

3. ILLUSTRATION ON THE CALCULATION OF COSTS AND REVENUES WITHIN THE ASE STRUCTURE

3.1. I.S.P.E. budget, structure in 2006

The application of the current models of the A.S.E. type for calculating the costs of design has led to the results in the table that follows:

<table>
<thead>
<tr>
<th>No.</th>
<th>Explanations</th>
<th>Approved 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td><strong>TOTAL REVENUE</strong></td>
<td>33,130</td>
</tr>
<tr>
<td>II</td>
<td><strong>TOTAL COSTS</strong></td>
<td>28,800</td>
</tr>
<tr>
<td></td>
<td>Material costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- consumable materials</td>
<td>900</td>
</tr>
<tr>
<td></td>
<td>- electric power, water</td>
<td>800</td>
</tr>
<tr>
<td></td>
<td>- depreciation</td>
<td>1,400</td>
</tr>
<tr>
<td></td>
<td>- other material costs (repairs,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>service, transport, tel, mail</td>
<td></td>
</tr>
<tr>
<td></td>
<td>protocol, advertising and publicity,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>service, security costs, etc.)</td>
<td>4,710</td>
</tr>
<tr>
<td></td>
<td>Labour costs</td>
<td>20,990</td>
</tr>
<tr>
<td></td>
<td>- wages (including meal tickets)</td>
<td>14,650</td>
</tr>
<tr>
<td></td>
<td>- insurance + unemployment +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>health + accidents + labour</td>
<td></td>
</tr>
<tr>
<td></td>
<td>chamber</td>
<td>4,240</td>
</tr>
<tr>
<td></td>
<td>- other labour costs</td>
<td>2,100</td>
</tr>
<tr>
<td>III</td>
<td><strong>RAW PROFIT</strong></td>
<td>4,330</td>
</tr>
</tbody>
</table>

The revenues are determined by the relation:

\[ V_{\text{total}}^{2007} = 1,10 \left( C_{\text{total}}^{2006} + p_{\text{profit}}^{2006} \right) = C_{\text{profit}}^{2007} + p_{\text{profit}}^{2007} \]

4. PANEL OF SWITCHING FROM THE CURRENT BUDGET STRUCTURE TO THE BUDGET STRUCTURE DESIGNED IN OPERATIONAL RESEARCH

The panel of switching from the current ASE structure of the budget at the level of I.S.P.E. in operational research is presented in Tables (2), (3), (4) specifying also the structure of the budgets by departments designing power plants.

### Table 2

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-category</th>
<th>Account</th>
<th>ACCOUNT NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Development</td>
<td>Search</td>
<td>628.06</td>
<td>Acquiring books, magazines, th. docum.</td>
</tr>
<tr>
<td></td>
<td>Forecast</td>
<td>621.01</td>
<td>Collaborators – legal persons</td>
</tr>
<tr>
<td></td>
<td></td>
<td>621.02</td>
<td>Collaborators – with civil contract</td>
</tr>
<tr>
<td>Risk</td>
<td>613</td>
<td></td>
<td>Cost on insurance premiums</td>
</tr>
<tr>
<td></td>
<td>628.09.2</td>
<td></td>
<td>Cost on military security</td>
</tr>
</tbody>
</table>

*The values that do not include sub-designers, that equally affect both the revenues and costs.*

3.2. Calculating the costs and revenues on real events dictated by operational research

The applications conducted at the European level and not only allow the assessment of the levels of operational research expenses based on the following guidelines:
### Table 3

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Account</th>
<th>ACCOUNT NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision making</td>
<td>614</td>
<td>Costs of studies and researches</td>
<td></td>
</tr>
<tr>
<td>Hierarchical communication</td>
<td>628.08</td>
<td>Technical assistance for other units</td>
<td></td>
</tr>
<tr>
<td></td>
<td>628.09.1</td>
<td>Technical and accounting expertise</td>
<td></td>
</tr>
<tr>
<td>Managerial training</td>
<td>625</td>
<td>Travel expenses, postings, transfers</td>
<td></td>
</tr>
<tr>
<td>Production costs</td>
<td>626</td>
<td>Postal expenses and fees for telecommunications Travel expenses, postings, transfers</td>
<td></td>
</tr>
<tr>
<td>Reengineering</td>
<td>628.09.3</td>
<td>Training costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>629</td>
<td>Travel expenses, postings, transfers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>601</td>
<td>Inventory objects costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>603</td>
<td>Expenditure on hutments and arranged. prov.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>605.02</td>
<td>Energy from technology tests</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6011.03.2</td>
<td>Annual repair materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6011.03.3</td>
<td>Overall repair materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6011.03.4</td>
<td>Retrofitting materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6014.1</td>
<td>Maintenance spare parts cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6014.2</td>
<td>Annual spare parts repair cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6014.3</td>
<td>Spare parts overall repair costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6015.1</td>
<td>Other maintenance material costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6018.1</td>
<td>Other annual repair material costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6018.3</td>
<td>Other annual overall repair material costs</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Account</th>
<th>ACCOUNT NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tariff grounding</td>
<td>641</td>
<td>Wages</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6451.01</td>
<td>Social insurance cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6451.02</td>
<td>Health insurance cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6452</td>
<td>Unemployment cost 5%</td>
<td></td>
</tr>
<tr>
<td>Economic</td>
<td>6458.1</td>
<td>Other social and health insurance cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6458.2</td>
<td>Financial recovery fund costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6811.1</td>
<td>Immobilization depreciation costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6811.2</td>
<td>Immobilization depreciation costs</td>
<td></td>
</tr>
<tr>
<td>Information birotics</td>
<td>626</td>
<td>Post and telecommunication tax</td>
<td></td>
</tr>
<tr>
<td></td>
<td>628.02</td>
<td>Data processing services, computer system information</td>
<td></td>
</tr>
</tbody>
</table>

The structure built in operational research avoids the crisis situation dictated by the lack of funds during the whole year of the forecast. This advantage is due to the fact that all the costs are quantified on real events both at the level of the design unit and at the level of the projects carried out for the designing and achievement of the designed energy objectives. If the managers prepare the conditions for passing to the new structure, then the total risks will be eliminated and supplementary funds will emerge from applying the acquired information and applied in various projects to which are added the general savings of removing the damage. In addition, increasing the working time by...
eliminating the expectations and increased productivity due to computerization will generate significant profits.

5. STRUCTURE OF ISPE BUDGET IN 2007 IN OPERATIONAL RESEARCHES

The budget designed on actual income and cost shaped in operational research has the structure in Table (5). The increases provided at the level of the income and cost in 2007 are 10%.

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Name of the efforts</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Total income (th. RON)</td>
<td>1,10 V&lt;sub&gt;2006&lt;/sub&gt; total</td>
</tr>
<tr>
<td>II</td>
<td>Total cost (th. RON)</td>
<td>1,10 V&lt;sub&gt;2006&lt;/sub&gt; total</td>
</tr>
<tr>
<td></td>
<td>Sustainable development cost</td>
<td>1,10 C&lt;sub&gt;2006&lt;/sub&gt; DD</td>
</tr>
<tr>
<td></td>
<td>Commercial activities cost</td>
<td>1,10 C&lt;sub&gt;2006&lt;/sub&gt; CC</td>
</tr>
<tr>
<td></td>
<td>Production cost</td>
<td>1,10 C&lt;sub&gt;2006&lt;/sub&gt; producție</td>
</tr>
<tr>
<td></td>
<td>Human resources costs</td>
<td>1,10 C&lt;sub&gt;2006&lt;/sub&gt; resursele umane</td>
</tr>
<tr>
<td></td>
<td>Economic and financial activities cost</td>
<td>1,10 C&lt;sub&gt;2006&lt;/sub&gt; economico financiare</td>
</tr>
<tr>
<td></td>
<td>Decision making and communication cost</td>
<td>1,10 C&lt;sub&gt;2006&lt;/sub&gt; decizie si comunicare</td>
</tr>
<tr>
<td>III</td>
<td>Total profit</td>
<td>1,10 p&lt;sub&gt;2006&lt;/sub&gt; total</td>
</tr>
</tbody>
</table>
| IV      | Allocation of total cost and income on real events design is based on key statistics | Calculation is performed for the level of the achieved operational income (4 + 10)% of the value of the objectives |}

The allocation of the income and cost on real events in the design objectives of energy is achieved by the following indicative schedule.

A. Operative structure of the income

\[ V_{2007}^{DD} = V_{\text{DD}}^{\text{search}} + V_{\text{DD}}^{\text{forecast}} + V_{\text{DD}}^{\text{risk}} = 1,1V_{2006}^{\text{DD}} \]

\[ V_{2007}^{CC} = V_{\text{CC}}^{\text{fuel energy}} + V_{\text{CC}}^{\text{forecast}} + V_{\text{CC}}^{\text{choice}} = 1,1V_{2006}^{\text{CC}} \]

The allocation of these costs on actual events of the six operators is done by calculating each category of cost and reporting on the resulting distribution keys that can be used from year to year if they take into account the undergoing changes.

This way one can correlate without risks the income with the actual costs and can estimate the final profit with negligible errors.

Further on we show the calculation mode of the costs by operators of the research of the actual fact.

\[ C_{\text{DD}} = k_{\text{DD}} \cdot C_{\text{tan}} = (k_{\text{search for information}} + k_{\text{forecast}} + k_{\text{risk catastrophe}}) C_{\text{DD}} \]

\[ C_{\text{CC}} = k_{\text{CC}} \cdot C_{\text{tan}} = (k_{\text{fuel, material, energy}} + k_{\text{decreased wait}} + k_{\text{market study}}) C_{\text{CC}} \]
\[ C_{PR} = k_{PR} \cdot C_{tan} = (k_{+ \text{innovation}} + k_{\text{economic state}} + k_{\text{quality}}) \times C_{PR} \]
\[ C_{RU} = k_{RU} \cdot C_{tan} = (k_{learning} + k_{ergonomy} + k_{post designer} + k_{information dialogue} + k_{encouraging creativity}) \times C_{RU} \]
\[ C_{EF} = k_{EF} \cdot C_{tan} = (k_{own funds} + k_{designing prices} + k_{birotics strategy}) \times C_{EF} \]
\[ C_{DC} = k_{DC} \cdot C_{tan} = (k_{training managers} + k_{designing decision} + k_{developing communication}) \times C_{DC} \]

For example, we write the relations for calculating the keys in the previous relations:
\[ k_{DD} = \frac{C_{DD}}{C_{tan}} \; ; \; k_{CC} = \frac{C_{CC}}{C_{tan}} \; ; \; k_{PR} = \frac{C_{PR}}{C_{tan}} \; ; \]
\[ k_{RU} = \frac{C_{RU}}{C_{tan}} \; ; \; k_{EF} = \frac{C_{EF}}{C_{tan}} \; ; \; k_{DC} = \frac{C_{DC}}{C_{tan}} \; ; \]

The data for calculating the keys in the structure of each player in the events are determined on a statistical view of the factors that cause expenses, actual revenue, respectively.

The final form of the revenue-cost budget will include the values of the income and cost mentioned in Tables (6-1) and (6-2).

### Table 6

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of estimated revenues and costs</th>
<th>Total value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total revenue (internal and external)</td>
<td>365 \cdot 10^{6} lei</td>
</tr>
<tr>
<td></td>
<td></td>
<td>36.5 \cdot 10^{8} RON</td>
</tr>
<tr>
<td>2</td>
<td>Total costs</td>
<td>330 \cdot 10^{6} lei</td>
</tr>
<tr>
<td></td>
<td></td>
<td>33 \cdot 10^{8} RON</td>
</tr>
<tr>
<td></td>
<td>Sustainable development cost</td>
<td>48 \cdot 10^{6} lei</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 \cdot 10^{8} RON</td>
</tr>
<tr>
<td></td>
<td>Commercial costs, including those</td>
<td>30 \cdot 10^{6} lei</td>
</tr>
<tr>
<td></td>
<td>destined to the study of the</td>
<td>3 \cdot 10^{8} RON</td>
</tr>
<tr>
<td></td>
<td>competitive market</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Production cost (design and other</td>
<td>16 \cdot 10^{6} lei</td>
</tr>
<tr>
<td></td>
<td>productive services)</td>
<td>16 \cdot 10^{8} RON</td>
</tr>
<tr>
<td></td>
<td>Human resources reconfiguring cost</td>
<td>216 \cdot 10^{6} lei</td>
</tr>
<tr>
<td></td>
<td></td>
<td>216 \cdot 10^{8} RON</td>
</tr>
<tr>
<td></td>
<td>Economic-financial activity costs</td>
<td>5 \cdot 10^{6} lei</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5 \cdot 10^{8} RON</td>
</tr>
<tr>
<td></td>
<td>Holistic communication – decision</td>
<td>5 \cdot 10^{6} lei</td>
</tr>
<tr>
<td></td>
<td>cost</td>
<td>36.5 \cdot 10^{8} RON</td>
</tr>
<tr>
<td>3</td>
<td>Programmed profit 15% from total</td>
<td>48 \cdot 10^{6} lei</td>
</tr>
<tr>
<td></td>
<td>costs</td>
<td>48 \cdot 10^{8} RON</td>
</tr>
</tbody>
</table>

* The potential revenue may grow by about 50 \cdot 10^{6} lei in reducing wait and in increasing productivity.

This structure ensures both the development of design activities and the cover of the shares that come to stakeholders every year.

### 7. EXAMPLES OF CALCULATION IN THE ENTREPRENEURIAL VIEW BASED ON OPERATIONAL RESEARCH

#### 7.1. Determination of optimal variant of sustainable development of the NPS objectives

- **Calculation data**
  
  Installed power: \( P_1 = 3700 \) [MW]
  
  Operating time: \( t_f = 6500 \) [h/yr]
  
  Loading degree: \( g_l = 0.9 \)
  
  Specific investment: \( i_{sp} = 1.5 \cdot 10^{6} \) [lei/kWinst]
  
  Depreciation quota: \( k_{amorage} = 4\% \) of the investment per year
  
  Lifetime: \( d_{av} = 35 \) [yrs]
  
  Domestic energy prices: \( p_{ext} = 2000 \) [lei / kWh]
  
  External energy price: \( p_{ext} = 100 \) [USD/MWh]
  
  Price not delivered energy: \( p_{uav} = 200 \) [lei/kWh]
  
  The probability of damage to the plant: \( p_{av} = \frac{1}{365} = 0.0027 \)

  In case of power failure:
  
  \( P_{av} = 0.25P_1 = 927.5 \) [MW]
  
  Power of a unit: \( P_g = 700 \) [MW]
Specific fuel consumption: 
\[ q = 0.5 \text{ [kg cc/kWh]} \]
Conventional fuel price: 
\[ p_{fc} = 140 \text{ [USD/cc]} \]
Calendar time: 
\[ t_c = 8760 \text{ [h]} \]
Programmed profit: 1% of the evened specific cost
Capital formation rate:
\[ r_c = 1.01 \text{ [lei income/invested leu]} \]
\[ T_{network-distribution} = 3 \text{ [USD / MWh]} \]
Personnel norm: 
\[ I_p = 2.4 \text{ [man/MWh]} \]
Return rate: 
\[ r_s = (10+30) \% \]

**Requirements**
1) To determine the optimal design variant of the sources of energy production;
2) Performance indicators to determine the profitability of the solution in the design and operation conditions;
3) Interpreting the results and commenting on the way they may apply to the NPS subjected to development.

**Resolution**
1) The optimal development variant of power systems as designed by the efficient technical economic and financial management

\[
C_{tan} = \sum_{i=1}^{dv} (1+r_c)^{-t_c} C_{tan} \quad \text{[lei during the lifetime of the power equipment]} \\
C_{tan} = \left[ k_{amortizare} \cdot I_p + p_{el} \cdot E_p \right] \quad \text{[lei/yr]} \\
I_p = sp - P_t = 15 \cdot 10^6 \left[ \frac{\text{lei}}{\text{MWinst}} \right] \cdot 3700 [\text{MW}] = 5565 \cdot 10^6 \text{[lei]}
\]
\[ E_p = t_c \cdot P_t = 6510 \cdot 3700 = 24.152.100 \text{ [MWh/yr]} \]
\[ P_t = 3700 \text{ [MW]}; \quad P_d = 700 [\text{MW}] \]
\[ P_d = 5 \times 700 = 3500 \]
\[ \Rightarrow p_{el} = 700 \text{ [MW]} \]
\[ P_{el} = 6 \times 700 = 4200 \text{ [MW]} \]

We will have two classes of costs:
\[ C_{tan I} = k_{depreciation} \cdot I_p + P_{el} + t_c \cdot P_t + C_{sustainable} \]
\[ C_{tan II} = k_{amortizare} \cdot I_p + P_{el} + t_c \cdot P_t + C_{sustainable} \]
\[ C_{tan I} = k_{depreciation} \cdot I_p + P_{el} + k_{depreciation} \cdot I_p + P_{el} + C_{sustainable} \]
\[ C_{tan II} = k_{amortizare} \cdot I_p + P_{el} + k_{amortizare} \cdot I_p + P_{el} + C_{sustainable} \]
\[ C_{tan I} = \sum_{i=1}^{dv} (1+r_c)^{-t_c} C_{tan} \]
\[ C_{tan II} = \sum_{i=1}^{dv} (1+r_c)^{-t_c} C_{tan} \]
\[ C_{tan} = \sum_{i=1}^{dv} (1+r_c)^{-t_c} C_{tan} \]

The cost analysis leads to the conclusion that the realization of a power plant with 5 power units of 700 MW each becomes feasible in terms of total updated costs.

2) The calculation of performance indicators to determine the sustainable development profitability of power systems

\[ r_c = p_{el} \cdot E_{el} + (R_{el} + t_c \cdot P_{el}) = 200 \cdot t_c \cdot P_{el} + I_p \cdot P_{el} \]
\[ = 200 \cdot 2 \cdot 10^{-6} \cdot 6510 \cdot 3500 \quad \frac{3500}{4} + 1.5 \cdot 10^9 \quad \frac{3500}{4} = 7.55 \cdot 10^9 \left[ \text{lei/yr} \right] \\
R_{el} = p_{el} \cdot E_{el} + I_p \cdot P_{el} = 200 \cdot t_c \cdot P_{el} + I_p \cdot P_{el} \]
\[ = 200 \cdot 2 \cdot 10^{-6} \cdot 6510 \cdot 4200 \quad \frac{4200}{4} + 1.5 \cdot 10^9 \quad \frac{4200}{4} = 9.066 \cdot 10^{12} \left[ \text{lei/yr} \right] \\
\]

The calculation of risks is carried out by applying the following models:

\[ R_1 = p_{el} \cdot E_{el} + I_p \cdot P_{el} \cdot 10^4 \left[ \frac{\text{lei during the lifetime of the} \text{power plant}}{\text{MWh}} \right] \]
\[ = 12857 \cdot 10^{12} + 7.55 \cdot 10^{12} = 3.88 \cdot 10^{13} \left[ \frac{\text{lei income}}{\text{leu invested}} \right] \\
R_{el} = p_{el} \cdot E_{el} + I_p \cdot P_{el} \cdot 10^4 \left[ \frac{\text{lei during the lifetime of the} \text{power plant}}{\text{MWh}} \right] \\
\[ = 12857 \cdot 10^{12} + 7.55 \cdot 10^{12} = 3.88 \cdot 10^{13} \left[ \frac{\text{lei income}}{\text{leu invested}} \right] \\
\]

The cost analysis leads to the conclusion that the realization of a power plant with 5 power units of 700 MW each becomes feasible in terms of total updated costs.
To determine:

1) The potential energies and powers to be produced in the power facilities provided with expert systems;
2) The indicators of economical operation of the installations supervised by expert systems;
3) The efficient operation conditions of the expert systems;
4) The determination of information entropy by considering the wear / repairs and the power production with some frequency, in the conditions in which there is a loss of activity at the level of the staff;
5) Commenting the calculated indicators, including the specification of the conditions for the implementation of expert systems in the generation, transmission and use of electricity installations.

### Resolution:

1) The calculation of the power and energy produced in the facilities supervised by expert systems

\[
P_e = P_{\text{max max}} = 2500 \ [\text{MW}]
\]

\[
P_{\text{el}} = 0.8 \cdot P_t = 2000 \ [\text{MW}]
\]

\[
P_{\text{el}} = (0.8 \div 0.5) \cdot P_t = (2000 \div 1250) \ [\text{MW}]
\]

\[
E_{\text{max max}} = t \cdot P_t = 8760 \cdot P_t = 21.9 \ [\text{MW}]
\]

This energy is taken into account in the strategic operation planning in perspective of the new energy objectives.

\[
E_{\text{ef}} = t \cdot P_t = 7000 \cdot P_t = 100 \cdot 10^9 \ [\text{MWh}]
\]

\[
V_{\text{max max}} = \rho_{\text{eln}} \cdot E_{\text{max max}} = 4.75 \cdot 10^9 \ [\text{lei}]
\]

\[
V_{\text{ef}} = \rho_{\text{eln}} E_{\text{ef}} = (26600 \div 166326) \cdot 10^9 \ [\text{lei}]
\]

\[
\rho_{\text{max max}} = [V_{\text{max max}} - C_{\text{max max}}]
\]

\[
C_{\text{depreciation}} = \rho_{\text{el}} \cdot P_t \cdot k_1 = 1.5 \cdot 10^9 \cdot 2501 \cdot 0.03 = 112,54 \cdot 10^9 \ [\text{lei}]
\]

\[
C_{\text{operation}} = \rho_{\text{el}} P_t = 33260 \cdot 10^9 \ [\text{lei}]
\]

\[
E_{\text{comb}} = 65 \cdot 30000 \cdot 0.2 \cdot q \cdot E_{\text{el}} = 884,35 \cdot 10^9,
\]

where \( q = 500 \ [\text{kgcc/MWh}] \).

\([E_{\text{comb}}] \) is possible fuel saving from the loading of units to 80% of the maximum power.

2) Indicators of economical operation of the supervised system expert

\[
P_{\text{value}} = p_{\text{entr}} \cdot E_{\text{r}} + i_{\text{sp}} \cdot P_{\text{av}} = 200 \cdot P_{\text{el}} \cdot t_{\text{av var ie}} \cdot P_{\text{av var ie}} +
\]

\[
+ i_{\text{sp}} P_{\text{av var ie}} = 5995 \cdot 10^9 \ [\text{lei}]
\]

\[
l = i_{\text{sp}} P_t = 15 \cdot 10^9 \cdot 2501 = 37515 \cdot 10^9 \ [\text{lei}]
\]

\[
r_{\text{c}} = \frac{E_{\text{value}} + P_{\text{risk}}}{l_1} = \frac{9495 \cdot 10^9}{37515 \cdot 10^9} \approx 2.3 \ [\text{lei income/leu invested}]
\]

\[
E_{\text{economic}} = 0.8 \cdot E_{\text{max max}} = 17,52 \ [\text{MW}]
\]
3) The efficient operation conditions of expert systems

The efficient operation of expert systems has to be correlated with the application of the following actions:

a) Starting up the cold standby units is carried out in increasing order of the empty running consumption;

b) Upon increasing the charge, the loading is performed in order of increasing the supplementary specific consumptions;

c) The discharge is carried out in reverse order;

d) The starting up and shutdown should be strictly managed so that the total fuel consumption by units and power plant should be minimal;

e) If the total consumption is minimal it means that the expected fuel saving was carried out and we managed to include the power plant among the units which contribute to covering the load curve. So, the power plant is able to meet the system requirements and be included into the order of merit which provides the minimum total consumption and the adequate quality of the energy produced and sold at competitive prices.

4) Calculating entropy

- Block diagram

\[
\begin{align*}
P_{comb} &= \frac{(t_{an} - t_{des})}{t_{an}} \frac{8760 - 300}{8760} = 0.9657 \\
P_{incomb} &= 1 - P_{comb} = 1 - 0.9657 = 0.0342 \\
P_{desc} &= \frac{(t_{an} - t_{int})}{t_{an}} \frac{8760 - 200}{8760} = 0.9771 \\
P_{benzi} &= 1 - P_{benzi} = 1 - 0.9771 = 0.0228 \\
P_{slack} &= \frac{(t_{an} - t_{slack})}{t_{an}} \frac{8760 - 333}{8760} = 0.9619 \\
P_{eack} &= 1 - P_{eack} = 1 - 0.9619 = 0.0380 \\
\end{align*}
\]

\[
\begin{align*}
e_{comb} &= -3.32 \cdot (\log(P_{comb}) + \log(P_{incomb}) + \log(P_{desc} + P_{benzi})) = 0.2244 \\
e_{eack} &= -3.32 \cdot (\log(P_{eack}) + \log(P_{desc} + P_{benzi})) = 0.1571 \text{ [bits/ev]} \\
e_{h \text{uman resources}} &= -3.32 \cdot (P_{eack} \cdot \log(P_{eack})) + P_{eack} \cdot \log(P_{eack}) = 0.2319 \text{ [bits/ev]} \\
e_{\text{discharge}} &= e_{comb} + e_{bands} + e_{eack} + e_{\text{human resources}} = 0.5996 \\
\end{align*}
\]

\[
\begin{align*}
P_{\text{rep}} &= \frac{(t_{an} - t_{sreptg})}{t_{an}} \frac{8760 - 800}{8760} = 0.9086 \\
P_{\text{indesc}} &= 1 - P_{\text{desc}} = 1 - 0.9657 = 0.0342 \\
P_{\text{sqgm}} &= \frac{(t_{an} - t_{sfgm})}{t_{an}} \frac{8760 - 400}{8760} = 0.9543 \\
P_{\text{asgm}} &= 1 - P_{\text{sqgm}} = 1 - 0.9543 = 0.0456 \\
P_{\text{afsn}} &= \frac{(t_{an} - t_{safsn})}{t_{an}} \frac{8760 - 500}{8760} = 0.9429 \\
P_{\text{afsn}} &= 1 - P_{\text{afsn}} = 1 - 0.9429 = 0.0570 \\
e_{\text{desc}} &= -3.32 \cdot (P_{\text{desc}} \cdot \log(P_{\text{desc}}) + P_{\text{desc}} \cdot \log(P_{\text{indesc}}) + P_{\text{desc}} \cdot \log(P_{\text{incomb}})) = 0.2149 \text{ [bits/ev]} \\
e_{\text{sgm}} &= -3.32 \cdot (P_{\text{sgm}} \cdot \log(P_{\text{sgm}}) + P_{\text{sgm}} \cdot \log(P_{\text{asgm}})) = 0.2659 \text{ [bits/ev]} \\
e_{\text{fin}} &= -3.32 \cdot (P_{\text{fin}} \cdot \log(P_{\text{fin}}) + P_{\text{fin}} \cdot \log(P_{\text{infin}})) = 0.3175 \text{ [bits/ev]} \\
e_{\text{electric}} &= e_{\text{fin}} + e_{\text{sgm}} + e_{\text{desc}} = 0.7965 \text{ [bits/ev]} \\
e_{\text{toral}} &= e_{\text{discharge}} + e_{\text{thermomec}} + e_{\text{electric}} = 2.6775 \text{ [bits/ev]} \\
\end{align*}
\]

- By pipeline diagram:

\[
\begin{align*}
P_{\text{repcaz}} &= \frac{(t_{an} - t_{sreptg})}{t_{an}} \frac{8760 - 800}{8760} = 0.9086 \\
P_{\text{repcaz}} &= 1 - P_{\text{repcaz}} = 1 - 0.9086 = 0.0913 \\
P_{\text{repcaz}} &= \frac{(t_{an} - t_{rep})}{t_{an}} \frac{8760 - 700}{8760} = 0.9200 \\
P_{\text{repcaz}} &= 1 - P_{\text{repcaz}} = 1 - 0.9200 = 0.0799 \\
\end{align*}
\]
The data provided in the contract of excellence for the year that follows refers to the following provisions:

- Increase in power production: +30%
- Decrease in specific consumption: -2%
- Increase in the depreciation by extending the fixed funds: +5%
- Increase in various expenses: +10%
- Increase in labour productivity by implementing expert systems: +25%
- Increase in electric power price: +3%
- Increase in profit: +10%

The costs in the reference year are 45 · 10^7 lei. The produced and sold power is 3.2 · 10^9 [MWh]. The subsidiary will apply next year two commercial strategies:

**S1** - Selling electric power directly to existing consumers A, B, C, D without resorting to the unique consumer the NPS;

**S2** - Selling electric power through the NPS and directly to external consumers.

- Domestic electricity prices
  - $p_{ei} = 2000$ [lei / kWh] and external
  - $p_{ex} = 100$ [USD / kWh] with
    - 1 USD = 32000 lei;
- The power delivery can be ensured both at peak hour and irrespective of the consumption hour required by the buyers.
- The demands of the consumers A, B, C, D in power and energy and the required state can be followed in the table below:

<table>
<thead>
<tr>
<th>Consumer states</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric power [MWh]</td>
<td>$1.2 \cdot 10^7$</td>
<td>$1.1 \cdot 10^7$</td>
<td>$0.6 \cdot 10^7$</td>
<td>$0.3 \cdot 10^7$</td>
</tr>
<tr>
<td>Demanded power [MW]</td>
<td>350</td>
<td>300</td>
<td>250</td>
<td>150</td>
</tr>
<tr>
<td>Imposed state</td>
<td>Irrespective of the consumption hour $i_s$</td>
<td>$i_s$</td>
<td>Peak hour $v$</td>
<td>$i_v$</td>
</tr>
</tbody>
</table>

Price of not delivered energy $p_{oi} = 200 \cdot p_{oi} = 200.000$ [lei/kWh], failure time: $t_{av} = p_{av} \cdot t_r = t_r/365$, $i_s = 1.5 \cdot 10^6$ [lei/kW installed], power in case of failure: $P_{av} = 0.25 \cdot P_{av} t_r$

**To determine:**

1. The structures of the tariffs applied to the NPS and the choice of prices for each strategy so that the income
should cover the risks and ensure the programmed profits.

2. The structure of the cost for electricity in the forecast year and the salary increase that staff involved in carrying out the contract of excellence may get.

3. The prices for each procedure requested by consumers (regardless of hours and peak hour of the NPS).

4. The revenues and risks such as profitability of the subsidiary should generate programmed profits.

5. Commenting on the results considering the establishing of the best economical financial development strategy of the subsidiary under analysis.

• Resolution

1. The structure of the tariffs applied in the national power system. In the NPS the following rates are used:

   - tariff (A) is the binominal type differential by voltage (HV), (MY), (LV) under the form:

     \[
     t^{\text{V}}_{\text{A}} = \left( \frac{A^{\text{V}}_{\text{A}}}{t_{\text{A}}} + b^{\text{V}}_{\text{A}} \right), \quad t^{\text{V}}_{\text{M}} = \left( \frac{A^{\text{M}}_{\text{A}}}{t_{\text{A}}} + b^{\text{M}}_{\text{A}} \right), \quad t^{\text{V}}_{\text{L}} = \left( \frac{A^{\text{L}}_{\text{A}}}{t_{\text{A}}} + b^{\text{L}}_{\text{A}} \right)
     \]

   - tariff (B) is a differential monominal type and operates with relations of the form:

     \[
     t^{\text{V}}_{\text{B}} = \left( \frac{F^{\text{V}}_{\text{B}}}{E^{\text{V}}_{\text{B}}} \right), \quad t^{\text{V}}_{\text{M}} = \left( \frac{F^{\text{M}}_{\text{B}}}{E^{\text{M}}_{\text{B}}} \right), \quad t^{\text{V}}_{\text{L}} = \left( \frac{F^{\text{L}}_{\text{B}}}{E^{\text{L}}_{\text{B}}} \right)
     \]

   - tariff (D) is a simple monominal and operates with relations of the form:

     \[
     t^{\text{I}}_{\text{D}} = \left( \frac{A^{\text{I}}_{\text{D}}}{t_{\text{D}}} + b^{\text{I}}_{\text{D}} \right)
     \]

   - tariff (E1) applies to consumers who take over the energy from the system during the day, and night, including Saturday and Sunday with the relations of the form:

     \[
     t^{\text{I}}_{\text{E1}} = \left( \frac{F^{\text{I}}_{\text{E1}}}{E^{\text{I}}_{\text{E1}}} \right)
     \]

   - tariff (E2) applies to consumers who take over the energy from the system during the day, and night, except for Saturday and Sunday:

     \[
     t^{\text{I}}_{\text{E2}} = \left( \frac{F^{\text{I}}_{\text{E2}}}{E^{\text{I}}_{\text{E2}}} \right)
     \]

   - Tariff (A) comprises variant (A2) as the differential binominal by voltages and different durations of use for the maximum power:

     \[
     t^{\text{IT}}_{\text{A}} = \left( \frac{A^{\text{IT}}_{\text{A}}}{t_{\text{A}}} + b^{\text{IT}}_{\text{A}} \right)
     \]

   - The binominal differential tariff (A33) is optional and applies to the hourly areas and durations of peak power use by the mathematical relations of the form:

     \[
     t^{\text{IM}}_{\text{A33}} = \left( \frac{A^{\text{IM}}_{\text{A33}}}{t_{\text{IM}}} \right)
     \]
The special tariffs resort to the leveled costs and marginal costs and are applied taking into account the following relations for calculation:

\[
t_{\text{CO}_P} = \frac{F_{\text{CO}_P}}{E_{\text{CON}}} = \left[\frac{C_{\text{DD}} - C_{\text{CC}} - C_{\text{PR}} - C_{\text{PE}} - C_{\text{AE}} - C_{\text{DC}}}{t_i \cdot P_i}\right] \text{(lei/kWh)}
\]

• increased costs 
• increased production by ao unit

2. The structure of the energy cost for the following year looks like this:

\[
C_{\text{fuel}} = 72\% \cdot 1.3 \cdot 0.98k_i = 91.7 \cdot k_i = 91.7
\]

\[
C_{\text{sl}} = 4.5 \cdot 1.3 k_i = 5.85 k_i = 5.85
\]

\[
C_{\text{depreciation}} = 8\% \cdot 1.05 k_i = 8.4 k_i = 8.4
\]

\[
C_{\text{wages}} = 2 \cdot 1.30/1.25 (1 + c_i)k_i \Rightarrow
\]

\[
2.40 k_i + 2.40 c_i = 2.4 + 2.4 c_i
\]

\[
C_{\text{variable}} = 13.5 \cdot 1.1 k_i = 14.85 k_i = 14.85
\]

\[
\frac{123.2 + 2.4 c_i}{123.2 - 2.4 c_i}
\]

Relating the new structure to the production of next year results \(c_i\) (higher wages).

\[
R_1 = \frac{123.2\% - 2.4 c_i}{13\%} = 94\% \Rightarrow c_i = \frac{123.2 - 122.2}{2.4} = \frac{1}{2.4} = 0.42 = 42\%
\]

So the annual salary increase may be 42% if the management contract provisions are met.

The electric power prices demanded by consumers are determined as follows:

\[
p_{\text{mb}} = \left(\frac{A \cdot P + b}{E}\right) \text{[lei/kWh]; } A = \frac{C_{\text{fuel}}}{P_i} \text{[lei/kWh]}; \quad b = C_{\text{variable}}/E_{\text{vanduta}} \text{[lei/kWh]}. \]

where:

\[
A = \frac{0.28 \cdot C_{\text{sl}}}{P_i} = 0.28 \cdot 45.10^5 \text{[lei/kWh]};
\]

\[
= \frac{1005 \cdot 10^5}{100} \text{[lei/kWh]};
\]

\[
b = \frac{0.72 \cdot C_{\text{sl}}}{E_p} = 0.72 \cdot 45.10^9 \text{[lei/kWh]};
\]

\[
= \frac{3.2 \cdot 10^9}{3.2} \text{[lei/kWh]};
\]

\[
p_{\text{mb}} = \left(\frac{A \cdot P + b}{E}\right)_{\text{mD}} = 900 \text{[lei/kWh]};
\]

\[
p_{\text{mb}} = \left(\frac{A \cdot P + b}{E}\right)_{\text{mC}} = 910 \text{[lei/kWh]};
\]

\[
p_{\text{mb}} = \left(\frac{A \cdot P + b}{E}\right)_{\text{mB}} = 1000 \text{[lei/kWh]};
\]

\[
p_{\text{mb}} = \left(\frac{A \cdot P + b}{E}\right)_{\text{mD}} = 840 \text{[lei/kWh]};
\]

4. The revenues and risks related to the energy subsidiary

The revenue from the power plant and the power system based on the export of electricity is calculated as follows

\[
V_{\text{CO}_E} = \left(p_{\text{sl}} - p_{\text{CO}_E}\right)E_{\text{vanduta}} = (100 - 34000 \cdot 10^{-3} - 900) \cdot 32 \cdot 10^9 = 2500 \cdot 32 \cdot 10^9 \text{[lei/yr]},
\]

\[
V_{\text{CO}_E} = \left(p_{\text{sl}} - p_{\text{CO}_E}\right)E_{\text{vanduta}} = (34000 - 2000) \cdot 32 \cdot 10^9 = 1400 \cdot 32 \cdot 10^9 \text{[lei/yr]}.
\]

The direct export without intermediate is more advantageous, even if the (4 + 6) USD / MWh fee is paid for transport and supply-distribution.

The net income carried out when the power plant is directly involved in export has the value:

\[
V_{\text{CO}_E} = \left(p_{\text{sl}} - p_{\text{CO}_E}\right)E_{\text{vanduta}} = 2000 \text{[lei/yr]},
\]

\[
V_{\text{CO}_E} = \left(p_{\text{sl}} - p_{\text{CO}_E}\right)E_{\text{vanduta}} = 1000 \text{[lei/yr]}.
\]

In this context the economic and commercial activities become profitable if they cover the total risks (economic, technical, financial on the production - competitive market relationship).

\[
R_{\text{total risk}} = p_{\text{ent}} E_{\text{ent}} + i_{\text{sp}} P_{\text{av}} = (200 p_{\text{ent}} \cdot \frac{t}{365} + i_{\text{sp}} P_{\text{av}}) \leq V_{\text{CO}_E}
\]

5. The analysis of the calculation results of the profitability of the energy subsidiary leads to the following findings:

- The tariffs applied in the NPS have to be correlated to those practised at the level of European energy sector in order to even the differences with a view to speeding up the total interconnection of the Romanian system with that of the European Union.
- The annual salary increase can be ensured especially from applying and carrying out the contract of excellence.
• The strategy that ensures maximum profitability of the subsidiary resulting from the sale of energy both domestically and for export directly to real consumers without recourse to intermediaries. Exports of energy at the top provides a maximum rate of formation of capital in income in lei per leu spent.

The practical orientating measures to increase the performance of the national power system relates to the following steps:

- Changing of the primary conventional sources with renewable ones leads to the decrease in electricity costs by 50% while simultaneously transforming miners into farmers growers of plants that can turn into biofuels.
- Operation of power equipment at economic tasks (0.8 Pi) monitored by using programmable logic controllers and filters that eliminate the harmful effects of harmonics 3 and 5 facilitate the transformation of risks in significant savings while reducing network losses by 15%.
- Reconfiguring the human resource through intensive learning and selection of the quality human factor based on the information instructions of the software based on the theory of cardinals is a source of success in implementing the POSDRU program.
- The practical application of the development of the NPS based on the alternative scenario regarding the efficient use of all the renewable resources, including of the entrepreneurial managers and efficient developers will lead to the profitable development of the whole Romanian system on the horizon (2020-2035) leading to increased competitiveness of the local energy sector, in both the domestic energy market in the Balkan area, and in earning the deserved place among the advanced countries in the area of Central Europe.
- If the share of fuels in the energy cost is reduced to 30%, then the final tariff drops to 50% of the current price of electricity.

8. REFERENCES