CONSTRUCTION DEVELOPMENT STRATEGIES IN IRAN TOWARD ENERGY EFFICIENCY

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Outlines

- Climate changes in Iran and importance of decreasing energy consumption in buildings
- Rules toward sustainability in Iran and related development plans and Strategies for sustainable development of cities
- International missions toward decreasing green house gasses
- Opportunities of energy efficiency in housing policies of Iran
- Major activities conducted by BHRC in line with optimizing the objectives of sustainable development
Climate changes in Iran and importance of decreasing energy consumption in buildings
Climate changes in Iran

- Iran is a country with diversity in climate.
- Iran is an area of arid and semi-arid land with fragile mountainous ecosystems and an economy seriously depends on the production. Accordingly, processing and sale of fossil fuels is very vulnerable to the negative effects of climate changes.
- Demolition of environment increases the adverse impacts of natural disasters.
Climate zonation in Iran

- Height dispersion
- Natural geography
- Ethnicity dispersion
- Vegetation
Global warming!
The effect on extreme temperatures, when the mean temperature increases, for a normal temperature distribution.
Increasing temperature and CO2 level in the world
Iran’s location in the global distribution of vulnerability to climate change
Iran is located in the area with the highest sensitivity to global warming.
Rules toward sustainability in Iran and related development plans
The Fiftieth Principle of the Constitutional Law

- Environment conservation is a public duty.

- Economic activities and other ones which involve polluting or irreparable damage to the environment is prohibited.”
The Environment Major Policies, 2015

Relevant Clauses

Clause 3. Healthy Environment and justice
Enhancement of living conditions in order to provide the society with a healthy environment and observation of justice and rights of inter-generations.

Clause 4. Prevention and avoidance of spreading unpermitted pollutants
Defining environment destruction as a crime and effective punishment of those who pollute and destroy the environment and forcing them to recompense the damage.

Clause 5. Constant monitoring and obligation in observing the standards
Constant monitoring and controlling the resources, air, water, soil polluting sources, noise pollution, signals and destructive rays and adverse climate change and obligation in observing the standards and environmental indexes in rules and regulations in country planning.
Clause 7. Climate change control and reducing side effects
Management of climate change and tackling environmental hazards such as desertification, dust and particles, drought and other elements of transmission of microbes, radio actives and futuristic view and understanding newly emerged environmental phenomenon and managing them.

Clause 3-8 developing the green public transportation like hybrid cars and improving public transportation especially in metropolitans.

Clause 11. Appropriate technologies and tools
Support and recognition of investments and technologies adopted to the environment using appropriate tools such as Green Tax.

Clause 13. Upgrading the technology
Improving studies and scientific research and benefiting from innovative technologies and local constructive experience in balancing the environment and avoiding polluting and destroying the environment.
The Fourth and Fifth Economic, Social and Cultural Development Program

**Article 192, clause A: Environmental Impact Assessment**
In order to reduce pollutant and destructive factors in the environment, all the major manufacturing, civil and service provision plans and projects have to have environmental impact assessment prior to commencing them and in the feasibility studies stage and in accordance with the rules and regulations of High Council of Environment Protection. Observing the results of the evaluations are compulsory for the implementers of the plans and projects.

**Article 192, Clause C: Improving Technical Features**
- Technical features must be enhanced in compliance with rules and standards of reducing pollution and destruction of resources especially natural resources and water resources

**Amendment 2: Evaluation of Economic Values of the Natural Resources and the Environment and Corresponding Costs Resulting from Pollution and Destruction of the Environment**
- The deputy is obligated to evaluate economic values of the natural resources and the environment and corresponding costs in the process of development and its assessment in national accounts of the projects giving priority to: jungles, water, soil, energy, environmental pollutions in sensitive spots and ratify them.

**Article 183, amendment one: Planning the Country and Land**
- Executive bodies are required to conduct their projects in line with realization of country planning objectives

**Article 62, clause A: Forth development plan**
- The government is obligated to decrease the air pollution of Tehran, Isfahan, Ahvaz, Tabriz, Arak, Karaj, Mashhad to the level of standard approved by high council of environment protection.
20-year Vision Plan for 2025

The necessity of:

- Health
- Welfare
- Food security
- Social security
- Equal opportunities
- Suitable distribution of income
- Strong family institution
- Reducing poverty corruption, discrimination
- Exploiting favorable environment
Relevant Clauses

- B-1: Due attention to the national and land integrity and intensifying Iranian-Islamic identity and management of land by: effective use of location, historical heritage and cultural and natural attractions in the country in line with development objectives, improving tourism and conservation of historical records.

- V-5: Prevention of out of control domestic immigration to the core of the province.

- Z-5: Selecting some capable metropolitans, harbors and islands and equipping them with high-tech communication and information services for admission of higher-level role.
Criteria of country planning, 2015

- De-concentration and decentralization of highly populated areas in the country especially Tehran and Isfahan
- Emphasizing the exploit of social, cultural and scientific capabilities of the provinces and zones especially, Tehran, Isfahan, Shiraz, Mashhad, Yazd, Tabriz and Ahvaz
Conservation the environment, decreasing the pollutant, desirable settlements, social and economical sustainability are some main indicators have been considered in development plans of Iran, specially in populated cities.

Implementation of these idea is in relation to harmony between policy makers and executers

Realization of these idea needs innovative tools, technology and new knowledge and also implementation plans
Strategies for sustainable development of cities
Cities cover only 2% of land area in the earth with about 50% of world population, but consume \( \frac{3}{4} \) of energy supplied in the world and produce 80% of green house gasses.

Over-urbanization and informal settlements have put more people and structures under risk and more pressure on environment.
Changing trend of cities number in Iran over twenty years (1375-1395)

Reference: MRUD
Changing trend of cities population in Iran over twenty years (1375-1395)

Reference: MRUD
Changing trend of cities number classified by population in Iran over twenty years (1375-1395)

Reference: MRUD
Impact of hot island, transferring pollution to the center of city by wind
Vacillations of annual average temperature in Tehran from 1950-2010
Opportunities and potentials of cities for sustainable planning

- **Effectiveness of strategies** toward environment conservation and energy efficiency,
- More opportunities because of **concentration of knowledge and wealth** in cities,
- **Less political limitation** in comparison with national and international scale,
- **Covering large target groups** for planning and providing services, because of centralization,
- Vast spread of innovations owing to existed **infrastructures**,  
- Possible **support** of all the procedure from design to implementation.
Cities Development Strategies

1. Sustainable Planning Strategies
   - National Scale
   - Local Scale

2. Implementation and Monitoring of Urban Planning
   - National Scale
   - Local Scale
Major imparted policies in urban planning (imparted in February 18, 2011)

Relevant Clauses:

2- Defining physical aspects of the cities in horizontal or vertical development with an emphasis on Iranian-Islamic identity and observation of cultural, social, economic, security, neighbors’ rights, infrastructure facilities, climatic and environmental considerations

5- Conservation of historical identity in balanced development of the city and villages by revitalizing historical patterns and improvement of structures or renovation of old patterns

6- Preventing slums expansion and organizing marginal and unfavorable existing patterns.

9- Observation of historical and spiritual identity of the cities in development and revitalization of urban environment especially Qom and Mashhad

11- Observing the needs and comfort of the paralyzed people in urban space and public space design.
International missions toward decreasing greenhouse gases
International missions


Iran policies in decreasing green house gas emission are divided into two parts:

1. National plans which fund by governmental budget with the aim of 30% decrease till 2025.

2. International funding and technical supports with the aim of 34% decrease till 2025 under supervision of UNFCCC.
Iran policies in developing renewable energy supplies

Renewable energy doesn’t have a noticeable share in Iran energy production (only 1% in 2013).

Some national activities for developing renewable energy production in Iran:

- Establishing professional governmental and private organizations,
- Approving the rule of guaranteed long-term purchase of electricity produced from renewable energy sources,
- Commitment to deliver saved fossil fuel or its equivalent to the beneficiaries of renewable energy sources,
- Supporting research and innovations related to localization of renewable energy technologies,
- Providing information and feasibility studies for establishing utilities of renewable energies.
Opportunities of energy efficiency in housing policies of Iran
The Share of different parts in energy consumption in Iran

- Transport
- Industry
- Houses and Commercial
- Agriculture
A comparison between allocated subsidies to the consumption of fossil fuels in Iran with other countries.
The ratio of subsidies to GDP

**Total Subsidy as Share of GDP (2012)**

- **Bangladesh**
- **Uzbekistan**
- **Ecuador**
- **Venezuela**
- **UAE**
- **Iraq**
- **Saudi Arabia**
- **Egypt**
- **Algeria**
- **Libya**
- **Iran**

![Bar chart showing the ratio of subsidies to GDP for different countries.](image-url)
Construction of new houses and renovation of existing buildings, both would give us opportunity for decreasing energy consumption in buildings toward conserving environment.
# Changing trends in lack of housing (1000 unites)

<table>
<thead>
<tr>
<th>Content</th>
<th>2006</th>
<th>2011</th>
<th>2013</th>
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<tbody>
<tr>
<td></td>
<td>Existing</td>
<td>Family</td>
<td>lack</td>
</tr>
<tr>
<td>Cities</td>
<td>11432</td>
<td>12406</td>
<td>974</td>
</tr>
<tr>
<td>Villages</td>
<td>4428</td>
<td>5096</td>
<td>668</td>
</tr>
<tr>
<td>Total</td>
<td>15860</td>
<td>17502</td>
<td>1642</td>
</tr>
</tbody>
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- There are more than 3 million deteriorated residential unites which need to reconstruct,
- There are more than 1.5 million residential units in informal settlements of Iran.

### Low-income housing situation in 2013

<table>
<thead>
<tr>
<th>Content</th>
<th>Low incomes</th>
<th>Average of the society</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ownership rate</td>
<td>59.8%</td>
<td>66.8%</td>
</tr>
<tr>
<td>Non-durable housing</td>
<td>49%</td>
<td>19%</td>
</tr>
<tr>
<td>Affordability Index</td>
<td>12</td>
<td>32</td>
</tr>
</tbody>
</table>
Regarding housing shortage, development plan includes following items:

- Individual private housings,
- Public invested in mass housing
- Non-Governmental invested in mass housing
- Renovation, reinforcement and reconstruction of exciting buildings, especially in deteriorated fabrics of cities.
Major activities conducted by BHRC in line with optimizing the objectives of sustainable development
Research Project in evaluation and improving performance of exterior layer of buildings:

- Studying the performance and feasibility study of applying layers and reflecting sheets in the exterior layer of buildings

- Studying and evaluating the solutions for improving thermal performance of windows using especial covering films and dual-window methods and presenting solutions for improving these elements in existing buildings

- Preparing detailed execution process of thermal insulation of building exterior layers (A Guideline on National Building Codes, code 19)

- Determining the performance of window glasses in administrative buildings with the mixed approach of thermal and light
Major activities conducted by BHRC in line with optimizing energy consumption and sustainable development

Research Projects in architecture design and urban development, such as:

- Climatic zonation of Iran, housing and residential buildings
- Climatic micro-zonation of different provinces
- A Guideline on climatic design for different provinces
- Recommendations on choosing mechanical installation systems which are suitable for various climatic situations
- Design and construction of model projects such as:
  - Designing a sustainable neighborhood
  - Execution of green roof
  - Execution of a Green roof
Research Projects in Transportation Fields such as:

- Compilation of a guideline for implementing of health, safety and environment management system (HSE-MS) and instructions for HSE in road and railway construction projects
- Estimation of external costs of road transportation sector in the country
- Presenting roads environmental management plans
- Pilot implementation of environmental audits for selected Roads and propose of final pattern
- Studying the effect of road traffic on nearby soil pollution; being polluted with heavy metals and oil hydrocarbons and presenting control and prevention solutions
- Studying the implementation method of Kyoto protocol in road transportation sector in the country
Major activities conducted by BHRC in line with optimizing energy consumption and sustainable development

Research projects on mechanical installations in buildings such as:
- Studying the performance of fouling systems in heating and cooling piping installations in small residential buildings
- Modelling, experimental and numerical analysis of using the land in thermal pump cycle for cooling and heating residential buildings in Tehran;
- Improving the efficiency of solar water heating using Nano fluid

Research Projects in the field of Building Materials such as:
- Studying the effect of density on thermal conduct coefficient and mechanical properties of thermal insulation of Expanded Polystyrene
- Preparing and submitting a thorough proposal on “manufacturing of innovative thermal insulation light-weight clay blocks with vertical and horizontal holes;
Compilation of rules and technical documents such as:

- Organizing technical committees for Building National Code, code 19
- Cooperation in finalizing bylaw article 18 of energy conservation for determining energy label for buildings
- Cooperation in the project of “energy label for building windows”
- Printing “selection instruction and utilizing cooling systems in public buildings;
- Membership in Building National Code, parts 14, 16 and 21
Major activities conducted by BHRC in line with optimizing energy consumption and sustainable development

Granting Technical Certificates and Offer Other Lab Services such as:

- Conducting technical certificate projects of dual-glaze windows, profiles, UPVC windows, Thermal break Aluminum, coated windows with improved thermal performance
- Granting 120 technical certificates to the installation products such as various heating packages fueled by gas, air ventilators, various blowers for buildings, polymeric pipes and water taps
- Technical certificates for polyurethane thermal insulation, glass wool and stone wool flexible elastomer foam
- Conducting case tests on various thermal insulation as the sole thermal insulation lab in the country
Training and Dissemination Activities:

- Organizing scientific seminars “new approaches in energy, comfort and safety inside and outside of buildings” in cooperation with Eindhoven University of Technology, Netherlands and Technical Institute of Karlsruhe, Germany (September, 2014)

- Cooperation in JICA Project “Establishment a center for Energy Training in Buildings” in Isfahan and Shiraz

- Cooperation with Isfahan Engineering Organization and Planning for Technical Training Courses for Training Supervisors and Energy Audits in Buildings

- Organizing the fifth international conference on heating, cooling and air-conditioning systems in June, 2014 and also organizing continuous meetings regarding the upcoming i.e. sixth international conference on heating, cooling and air-conditioning systems

- Compilation of documents and chapters and equipping Shahid Tafvizi Training Center in order to train Instructors, Engineers, Building Installation Technicians with the objective of learning amendment methods and improving Installation Mechanical Rooms with the Objective of Energy Conservation

- Attracting Support and signing MOU for well conduct of technical certificate process and also activities related to amendment of clause “GHAF” of the budget law

- Organizing training workshops regarding health, safety, environment management systems (HSE-MS) in civil projects
Thank You