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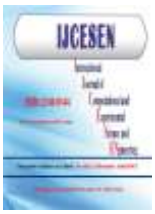

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Research Article

Renewable Energies Are The Basic Technology For Building Smart Cities Of The Future

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Abstract:

By 2050 More than, half of the world's population lives in cities. Urban areas are affected by 70 percent of emissions. Pushing the planet into an. unknown climate, but the challenge is clear and urgent: cities must be re-planned. Rapid urbanization has led to additional challenges such as traffic congestion, Social inequalities, water pollution urban change and related health and pollution issues."We are at a tipping point." so we need a "planning revolution" that produces cities. With a strategic and. compact structure with mixed-use, lands and buildings, with a focus on integrated urban systems, including walls, green roofs, decentralized energy systems, biodiversity corridors, complete networks and their operation by, renewable energy sources, and better use of spare capacity. through a shared urban economy. One of the goals of smart cities is to create a "three-dimensional 3D" computer model so that the progress of things can be monitored and controlled by officials. One of the findings of the research is that smart city models are expected to spread on a large scale, and these models will form the basic rules of the city and development plans, smart cities reduce greenhouse gases because they lack carbon dioxide, future smart cities depend on electric energy mainly to run all Almost something, the discovery of different types of organic building materials, which are distinguished by different degrees of permeability, that is,architectural building blocks consisting of fibrous materials in fungal roots, as strong as concrete and insulating as "fiberglass".

1. Introduction

Modern cities grow as a result of huge waves of development and investment, and with great financial estimates that the goal is sometimes to improve the quality of life, or to attract investment and tourism, but what governments and countries sometimes do not succeed in, is to make people love to live in them. In some of these cities people move away from them and turn into a ghost city, due to their failure to execute the promises of their magical solutions. Two-thirds of the population is expected to live in cities by 2050,[ ] and civilized areas affect with 70% of the emissions that push the planet into an unknown weather, but the. Challenge is clear and urgent, that cities, must be re-planned. We are at a "turning point", so we have national and local governments make strong commitments. Increasingly recognizing the importance of urban planning, we lack the capacity to plan in many places. What we need is a "planning revolution" that produces organized and strategically integrated cities with mixed-use land and buildings with a focus on integrated urban systems with green roofs, walls, biodiversity corridors, decentralized energy systems, grid completion and renewable energy. Better use of surplus energy through the shared economy. These cities must be low carbon, they must be resource efficient and socially equitable. Urban demand for resources could rise by 125% by 2050. At least 200 new cities are expected to be built in Asia over the next 30 years. This is an opportunity to transform the projected urbanization into a more environmentally and socially sustainable path. Decisions made today about urbanization and land use models, as well as critical infrastructure, will determine whether our investments are future-proof or actually set us on an unsustainable

At The research presented a summary on clean renewable energy sources and mitigating the effects of climate change "SRREN" **"Special Report**

on Renewable Energy Sources and Climate Change Mitigation (SRREN)" [ ] based on the report prepared by the third working group of the Intergovernmental Panel on Climate Change (IPCC) [ ] as an important source. The report provided an analysis and evaluation of renewable energy technologies and their role now and in the future in mitigating the effects of climate change. Greenhouse gas emissions. The results presented in this report are based on an extensive review and evaluation of scientific writings and research, as well as on the analysis of these studies in order to obtain broader conclusions. The report includes "policy-related, not policy-enforced information" for decision makers regarding the characteristics of the technical capabilities of the various resources; the historical development of technologies; and the challenges that. Facing the use of these technologies; the environmental, social and economic impacts of their use; As well as comparing the costs of obtaining renewable energy using available technologies throughout the life of this energy, with the current costs of conventional non-renewable energy. In addition, the role of renewable energy sources in stabilizing greenhouse gas concentration levels.

1.1 Research Problem

The world is going through an energy crisis and its prices are rising, in addition to the environmental pollution that occurs from the production of this traditional energy and the search for better alternatives to provide the required amount of inexhaustible, clean and environmentally.
Friendly alternative energy, and among these energies solar energy, and its exploitation in the application of advanced technology To get to smart cities.

1.2 Research Objective

Spreading knowledge of clean renewable energies and their impact on the lifestyle and quality of life by eliminating many types of environmental pollution and supporting the economy through its adoption of natural resources in the production of crisis energies and spreading knowledge of advanced technology on which the production of renewable energies is based, especially in the third world countries to change cities into future smart cities.
Today's cities face many common challenges in safety, transportation, accessibility, emissions and congestion. With estimates of urban population growth rising from 54% in 2014 to 66% by 2050, pressures on city services and infrastructure are also expected to increase [4].

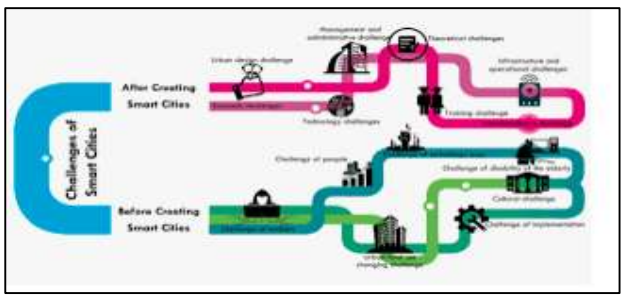

Figure 1.*Mapping of smart city challenges*

2. Previous Studies

2.1 First Study

The challenge of sustainability: Balancing China's energy, economic and environmental goals
John Byrne University of Delaware
Bo Shin University of California, Berkeley 2021
In recent years, China has experienced rapid economic growth and equally rapid increases in energy use. As a result, energy induced environmental degradation has also increased in China, especially in its urban areas. When this fact is coupled with China's requirement for further economic expansion to meet the growing needs of its population, it is clear that the country faces great challenges in balancing its goal of economic growth with environmental sustainability. This paper suggests that an alternative energy path emphasizing energy efficiency and renewable energy development can be in China's long-term economic and environmental interest.

2.2 Second Study:

Renewable energies and their role in protecting the environment for sustainable development
Majid Ahmed Ibrahim/University of Fallujah/College of Law
Tikrit University Journal For Rights 2016
Through the study of this. Research was to identify the various renewable, and alternative energy sources, and also to renewable energy. is not one type , and it includes many forms, that can solve each other and in the case of: the availability of potential conditions, such as and presence technology underlying the. Substitution and also bear the cost of this replacement, and with the increasing global awareness of environmental issues, and the realization everyone that it is necessary to preserve the, planet and be taken into account ' the environmental aspects in the use of conventional energy of all kinds. From natural gas

or coal or oil, as the main causes, the pollution of the environment. elements, as well as the classification, of traditional energy among resources, depleted that it is impossible, to compensate new balances of them or, this configuration requires long periods of time may. up to hundreds of thousands, of years or more, pushed many countries of attention, providing, an alternative energy component. of a renewable energy. which vary to different sources, from solar energy. to wind power, to biomass and other renewable energy sources that we have dealt, with energy according to their. Importance and include them and their contribution to the, supply of energy to the world, Alternative and its ability to continue. to flow, and also the. extent of their ability to achieve sustainable. Development and the achievement, of societal well-being and, future of the world

2.3 Third Study

Building Smart Cities and Communities: Employing ICT for Social and Economic Development sustainable . [City as a platform for development]:
Document 343/2 of the Telecommunication Development Sector Study Group submitted by the Republic of Korea.
The main problem for smart cities is the definition of the concept. There are several concepts and definitions, but they differ among themselves
One open question is whether smart cities should be viewed as “products or platforms”, given that products and platforms have very different connotations, the product performs a complete and independent function but once it is produced, it stops evolving
In contrast, the platform does not perform a full function by itself, but continues to evolve and innovate.
Some cities and companies around the world have taken the lead by implementing the concept of the Intelligent Operations Center (IOC) also referred to as the “urban brain”.

2.4 Fourth Study

[green-energy systems are important for smart cities]
By Maurizio DiPaolo Emilio, Editor-in-Chief of Power Electronics News & EEWeb 2022.
The transition to sustainable and renewable energy due to the slowdown in climate change is through the development of green energy solutions.
Cities are growing in flexibility and scale, requiring strong, smart, and green infrastructure to fully thrive. National Economy Creativity, culture and opportunity are fueled by cities. Despite this, many cities are underdeveloped in public utilities and services (housing, water, transportation, energy, and sanitation) as more people move there to work or study. In many regions of the world, traffic congestion, pollution and cheap housing are major concerns. in the city.
To slow and halt climate change, harmful emissions must be reduced to zero. This can be achieved through the generation of sustainable and renewable energy and by bringing about a change in energy systems. In addition, electricity networks must be sustainable, more reliable and able to combine different renewable energy sources in the best and most flexible way possible.

3. What Will the Future Smart Cities Look Like?

Cities are the machines in which modern societies revolve, as the international economy is strengthened and they consume a large share of the available resources on Earth, as well as being responsible for pollution and gaseous emissions, and they are the home of the majority of the world's population. Today, cities are rapidly becoming smart cities, including energy, technology, infrastructure, movement, construction, healthcare, governance, education, homes, and the citizens themselves. It is estimated that by 2050, cities will be home to 70% of the Earth's population, will consume 80% of the world's energy and 75% of raw materials, and will be responsible for 75% of carbon dioxide emissions that is harmful to health and cause weather change. Despite the large cities consumption of energy, the current numbers are not comparable to the size of the consumption of large cities in the future, but even the near future. Forecasts indicate that, in our time, we will witness the expansion of civilized areas in Africa and Asia until their population exceeds fifty million. These populations will consume more food, energy, and other materials than most countries in the world. The Internet will solve the problems that accompany the transformation of cities. [5]

3.1 Carbon Dioxide Emissions-Free Cities of the Future

To face the carbon dioxide emissions in cities, keen initiatives to protect the environment have appeared and projects for future cities free of carbon dioxide gas have been developed. However, the global financial and the real estate crises affected the success of these projects. The future cities, free of carbon dioxide emissions, are featured by the

shortness of their roads in a way that makes their residents reach different places on foot or by bicycle. However, this does not necessarily mean that these cities will be small in size, as each of its neighborhoods is designed in such a way that is connected to the public transport network [7], where Citizens can leave their car or abandon it permanently
And use public transportation. The goal of such cities is to save energy and not rely on fossil resources. A study supervised by Peter Sean and Andrei Muller from the German Federal Institute for Construction and Urban Affairs shows models of housing units of different sizes that tried to win the bet and present themselves as pioneering projects for future cities free of carbon dioxide gas. [8].

3.2 How Will the Photovoltaic Cells Form the Building Nucleus of the Future Cities?

The future smart cities rely on electric energy mainly to run almost everything, and it is no longer acceptable or logical for these modern cities to derive the necessary electric power for them from traditional fossil fuel sources, which are limited as well as harmful to the environment. The concept of methods that use photovoltaic cells to generate electricity is a valuable addition that is expected to bring the future smart cities closer to the reality. These methods allow for the possibility of generating sustainable electric energy through sunlight in large quantities and transferring it directly to cities and places of need, as well as the possibility of using it innovatively.[9]

4. Transformation to Smart Cities Through Applications of Green Energy

The use of clean energy sources and environmentally friendly transportation are the main elements of reducing greenhouse gas emissions, and according to Paris Climate Agreement at the United Nations Climate Change Conference 2021 recently held in the Scottish city of Glasgow. Several new points of commitments were spoken about to speed up the transition to the use of environmentally friendly means of transportation, which are featured by zero emissions of harmful gases to the environment. Introducing low-carbon or zero-carbon fuels such as hydrogen can significantly reduce harmful emissions, and in fact, if clean fuels or electric vehicles are not used, the energy demand in the transportation sector is expected to rise by 54% by 2035, which leads to a significant increase in global demand for fossil fuels [10].

4.1 Encouraging Environmentally Positive Change

A very quick transformation to the use of clean and environmentally friendly energy sources and encouraging the sustainable green car initiative to reach the percentage of environmentally friendly cars on the roads to 10% by 2030, is considered a dynamic part of the vision of countries that are on the way to transform into smart cities, considering them to be sustainable and friendly environments to the environment. The use of transportation and electric vehicles is one of the promising means within the framework of the efforts that aim to speed up the transition to cleaner and more energy-saving transportation systems, which encourages the movement and the presence of appropriate infrastructure, such as increasing the number of charging stations for road users and ensuring the operation of these stations using regenerated energy sources.

4.2 An Innovative Method That Improves the Use of Solar Energy

The idea of transforming abundant solar energy into two different forms of energy: chemical energy in hydrogen and electric energy in batteries, and with providing a hydrogen energy storage system, the electricity generated by the use of solar energy technology, such as photovoltaic cells can meet the required power loads, despite the changeful and random nature for solar energy. This hybrid energy storage system combination can achieve many benefits including: long-term energy storage, providing a more flexible charging schedule for electric vehicles, reducing the potential deterioration for batteries, reducing the use of diesel generators and stopping harmful gas emissions [11].

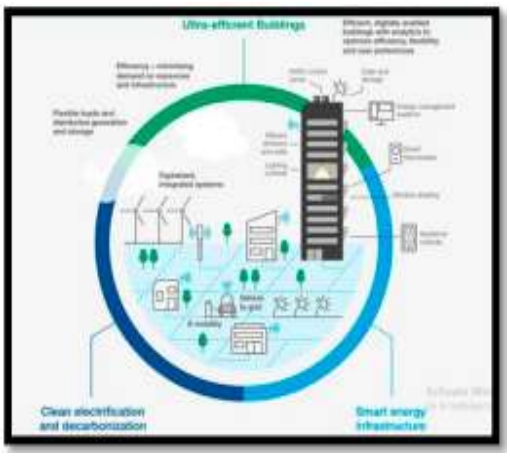

Figure 2. *A net zero carbon future for Smart Cities*

5. Roads that are Capable of Generating Electricity through Photovoltaic Cells without Giving up Road Solidity and Quality

The road construction model that is capable of generating electricity through photovoltaic cells relies on three additional layers that are added to the traditional asphalt road construction method. Electrical energy is generated through a connected layer of sensitive photovoltaic cells, and that layer is covered with another layer of an innovative transparent asphalt material that allows sunlight and light to pass to the photovoltaic cells from below, but at the same time, it has a texture exactly the same as asphalt. The last bottom layer consists of insulating materials to protect the photovoltaic cells from environmental conditions. An area of 20 m^2 of these roads equipped with photovoltaic cells can generate electrical energy that is sufficient for the needs of one home throughout the year. As for the experimental road opened by China, which is one kilometer long, it is capable of generating electric power amounting to one million kilowatt / hour, which is sufficient for the electricity needs of 800 homes per the year [12].

6. A new reality in the future cities

There is no doubt that the future cities will be more sustainable, more efficient and less polluted, and I have no doubt that we are becoming day by day closer that these cities to become a reality. Photovoltaic cells will play a pivotal role in these cities and fossil fuels will disappear, or their use will become limited sooner or later. The high cost is still the main obstacle, as for the spread of this and other technologies, as the cost of one square meter of roads equipped with photovoltaic cells is approximately $500, but I tend to believe that this obstacle will disappear soon [13].

Figure 3. *Roads that are capable of generating electricity*

6.1 The Basic Principles and Transformations for Future Cities

These principles lay the foundation for the future map, benefiting both humanity and the environment. Implementing them requires a courageous political decision backed by technical translation and comprehensive scientific, social, and economic research.

Cities are "meeting points for cultures, ideas, and capitals in the world, making them the basis of economic development." Countries are "groups of cities, and the success of countries is measured by the success of cities that compete globally in their economies, attract talent, and offer a high quality of life." Therefore, "the future of countries, people, and life is directly linked to the future of cities."

There are seven basic principles for future cities, including:

1. A radical transformation in city design.
2. Mobility methods.
3. Ways of living.
4. Resource usage methods.
5. The concept of competition.
6. City economics.
7. Governance.

These seven principles and the fundamental transformations that cities around the world will witness in the coming years highlight ways to prepare for them and take advantage of the opportunities they provide.

- **The First Transformation: Designing Cities to Keep Pace with the Era We Live In**
- **The Second Transformation: Mobility in Cities**
  If we convert 5% of transportation means from traditional to self-driving, it will reduce overcrowding by 40%.
- **The Third Transformation: Living in Cities**
  The increasing role of artificial intelligence, virtual reality, and augmented reality in individual lives will transform how we live in cities. The data revolution from IoT applications and self-driving mobility systems will make cities more connected, safer, smarter, and more productive.
- **The Fourth Transformation: Resource Usage in Cities**
  Technology will change how we consume resources, making them more efficient and environmentally friendly.
- **The Fifth Transformation: The Concept of City Competition**
  Future global cities will compete as open platforms for connecting minds, developing ideas, and fostering innovation.
- **The Sixth Transformation: City Economics**

Attracting efficiencies and talent will drive technological progress and create opportunities in three economic sectors: the data economy, the sharing economy, and the circular economy.

- **The Seventh Transformation: Governance**
  Flexible governance and leadership are essential for enabling future life models within cities. The role of city leadership shifts from providing solutions and services to enabling the design of these solutions in partnership with the private sector and the community.

7. How Future Cities Will Be Filled with Environmentally Friendly Homes

For a long time, architects used "hard" materials like concrete, glass, and aluminum to prevent external environmental elements from entering homes. However, our built environment wastes many resources and spreads toxic materials. Today's buildings isolate our working and living spaces, and automatic air conditioning systems are designed to keep summer heat out. Such buildings ignore the metabolic processes that are the dynamic basis of life systems.

8. The Green Center

During the 1970s, Jack Todd, John, Nancy, and Jack William founded the New Institute of Chemistry, which became the Green Center on Cape Cod, Massachusetts. This center rethinks building green spaces as part of a self-sustaining human ecosystem. These spaces are not completely closed but are open, allowing natural elements to flow in. The research institute has experimented with various sustainable systems, such as solar energy, aquaculture, bio-shelter design, and organic farming, all aimed at achieving permeability in living spaces. The results indicate significant progress. [16]

8.1 Construction Materials in Future Cities

Over the past 20 years, engineers have developed various organic building materials with different levels of permeability. For example, architectural building blocks made from fibrous materials in fungal roots are as strong as concrete and as insulating as fiberglass.

1. **Microorganisms**: [BioMASON] bricks are made of microorganisms and do not need to be fired. They are as strong as traditional building materials. Plastics are produced using bacteria from biogas from landfills and sewage treatment plants. Since bio-plastics are not derived from petroleum, they have lower carbon footprints. These soft materials allow for different combinations of geometric shapes and structural features that are not possible with conventional construction. When treated, these materials can be used as solid interfaces with the environment. "Ceramics can be specially treated to provide flexible surfaces in biological settings," i.e., large, consistent colonies of bacteria or other microorganisms. When biological surfaces are treated with manganese, they become filters that regulate the flow of water and air into the building.
2. **Electricity Generation**: Fungi combine carbon dioxide and sunlight to produce biomass, which can be used to generate electricity. Transparent cisterns regulate the building's temperature by increasing biomass and absorbing more sunlight. The water in these cisterns is permeable but allows sunlight in, which is crucial for organic exchanges within the building.
3. **Transforming Bathrooms and Kitchens**: The project aims to transform commercial spaces, bathrooms, and kitchens into environmentally friendly, productive areas. Parietal parts of these spaces are replaced with self-containing microbe systems and biologically interactive materials. There are several types of bio-reactor fuels:
   - A fuel cell containing anaerobic bacteria to produce electricity and pure water.
   - An [algae photo-bioreactor] producing biomass for fuel or food.
   - An [industrial bioreactor] that can produce alcohol and other plant-derived substances. [17]

8.2 Generating Electricity

Fungi combine sunlight and carbon dioxide to produce biomass for electricity generation. Bio-transparent cisterns regulate the building's temperature by absorbing more sunlight and increasing biomass. The European Union is co-financing the Bio-architecture project, which aims to produce display models of semi-permeable designs.

8.3 Transforming Bathrooms and Kitchens

The project aims to transform bathrooms, kitchens, and commercial spaces into environmentally friendly, productive sites. Parietal sections are replaced with biologically reactive materials and

self-containing microbe systems. There are several types of bio-reactor fuels:

- A fuel cell containing anaerobic bacteria to produce electricity and clean water.
- A [photo-bioreactor of algae] producing biomass for fuel or food.
- An [industrial bioreactor] that can produce alcohol and other plant-derived materials.

The walls of the "bioreactor" must be strong enough to serve as internal dividers while being active for other functional parts of life inside the building.

8.4 Synthesizing New Cleaners

Local wastewater from cleaners and fertilizers can be recycled to produce garden fertilizer. New biodegradable cleaners can be synthesized from gray water (from washing machines, dishwashers, and bathtubs), carbon dioxide, and sunlight. Future bioreactors can generate bio-lighting, produce nutritional supplements rich in beneficial elements, and eliminate problematic compounds like [PCBs] used in waterproofing. In commercial spaces, bio-walls can recycle water, nourish green rooftops, enrich soil, and purify the air, making building interiors healthier and more natural. [18]

8.5 More Building Materials of the Future

1. Paint that can detect structural cracks.
2. Carbon fiber rope to increase the height and durability of skyscrapers.
3. Luminous plastic in the wind.
4. Concealed solar cells.
5. Bamboo, whose strength and durability are comparable to steel and concrete.
6. Smart bricks that are scalable for different designs.
7. Wallpaper that can charge your phone. [19]

9. The Transformation Towards Regenerated Energies in Iraq

9.1 Sustainable Transformation of the Iraqi Energy System

By applying a phased model for the transition to renewable energy in the Middle East and North Africa to Iraq, [20] a guiding vision can be developed to create a crisis strategy and direct this process. Currently, Iraq lags behind its regional competitors in developing renewable energy technologies and lacks a specific strategy for the renewable energy sector. Transitioning to a sustainable energy system in Iraq will ensure a reliable and affordable electricity supply, achieve savings, and create opportunities for long-term economic development. [21]

9.1.1 Staged Model of the Transition Process in the Energy System in the Middle East and North Africa

Assuming the staged model of the German energy system, developed by Fisdic et al., 2014 [22] and (Henning et al., 2015), is appropriate for the Middle East and North Africa. The transition stages remain the same, providing clear objectives for system development and guiding principles for decision-makers.

Since specialized fields are required to raise the level of innovations, a "specialized fields" layer must be added to the original staged model developed by (Fisdic et al.). [22]

Innovations for each of the four stages are as follows:

1. **First Stage**: Renewable Energy Techniques.
2. **Second Stage**: Flexibility Options.
3. **Third Stage**: Techniques for Transforming Energy into Fuel/Gas.
4. **Fourth Stage**: In sectors that cannot be decarbonized, such as aviation and heavy industry.

Each innovation group is based on the process of forming specialized areas in the previous stage. Specific management measures are useful for completion and improvement processes at the current stage, and the diffusion of innovations is crucial for completion. Thus, adding a "specialized operations layer" creates a focus that achieves the system's goals. The "technical-economic layer" describes how to change the mechanism of technology diffusion in different markets, while "the management layer" reviews the stages of management, linking developments in the technical-economic class to the economic level.

A management approach supports the phased transition, with specific measures focusing on creating an energy system based on renewable energy sources. Factors such as capacity, markets, infrastructure, and disruption of the existing fossil fuel-based energy system must be individually evaluated and adapted to each country in the Middle East and North Africa. This study pays special attention to the landscape level and its role in pressuring existing systems and creating opportunities for change. The study examines each country's case regarding the impact of international regulations on climate change, regional and global conflicts, and the long-term effects of the Corona virus (Covid-19) on the energy transition steps. It also emphasizes the need for continuous

improvement of energy efficiency throughout the process. Through resource efficiency, the scale of the model expands, assuming a continuous decrease in material density through efficiency measures and circular economy principles. The three phases of the transition and the multi-level perspective prevent "completely predicting or directing energy transitions." Multilateralism and efficient processes lead to an advanced level of exchange and confusion towards "economic, technological, cultural, and social" developments. Because of the interdependence of processes, translational process research typically uses interdisciplinary approaches. The multi-level perspective is an outstanding framework, providing a basis for developing management measures and facilitating the understanding of the transition process [23].

9.2 The Three Phases of Transition and the Multi-Level Perspective

At the (landscape) level, pervasive trends, such as climate change, demographic shifts, and economic crises, affect the (system) and (specialist) level. The (system) level represents as the social and technical system that dominates a private sector, and the system here is the energy sector. Which consists of “existing technologies, regulations, user patterns, infrastructure and cultural discourses that combine to form social and technical systems”, and in order to modernize and change the system at the (system) level, avoiding the adoption of existing paths and exclusive dependency. Innovations are applied progressively at the level (specialized areas), as they create the basis for systemic change. Specialized fields are formed in protected areas, such as research and development laboratories . Managing the transition requires constant monitoring, experimentation, learning, adaptability and reflective thinking, as well as policy coordination at different levels and sectors. The progress of specialized fields in the management of strategic areas is a prerequisite for achieving substantive change and it can be within transitional stages, and the characteristic of the three stages and the policy approach that is related to each of them, namely (achievement), (formation of specialized areas), (market-based growth). In the stage of (formation of specialized fields), the specialized field develops and matures, and solutions can be presented that the system can accommodate. Expectations and insights provide guidance for the key processes in this phase as well as learning in engaging effective trends and creating social networks. Learning processes at different levels have the potential to advance technology at the (achievements) stage, and niche innovation spreads more widely by increasing the number of particular effective directions, increasing market share and implementing similar innovations on other sites. It is important at this stage to improve the ratio between cost and performance, while providing access to the necessary infrastructure and markets. Amending rules and laws and increasing social awareness and acceptance would reduce barriers to using these domains. When niche innovation becomes fully competitive in terms of price, and a specific and supportive policy is no longer needed, the "market-based growth" phase would have occurred, and renewable energy technologies at this point became fully integrated within the multi-tiered system [24].

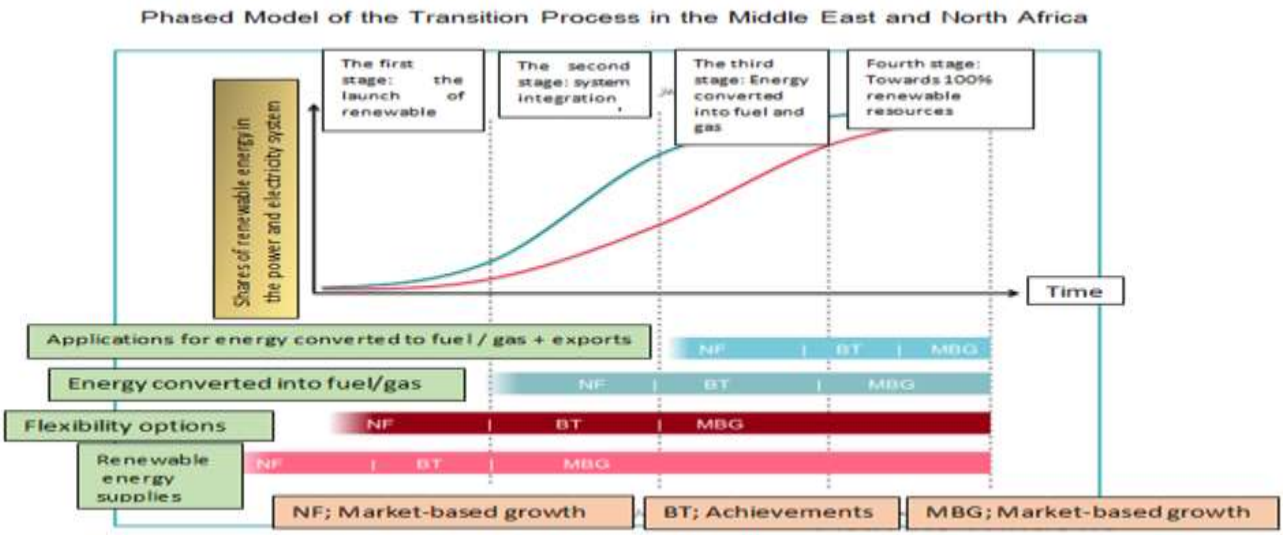

Figure 4. *Diagram energy transfer process*

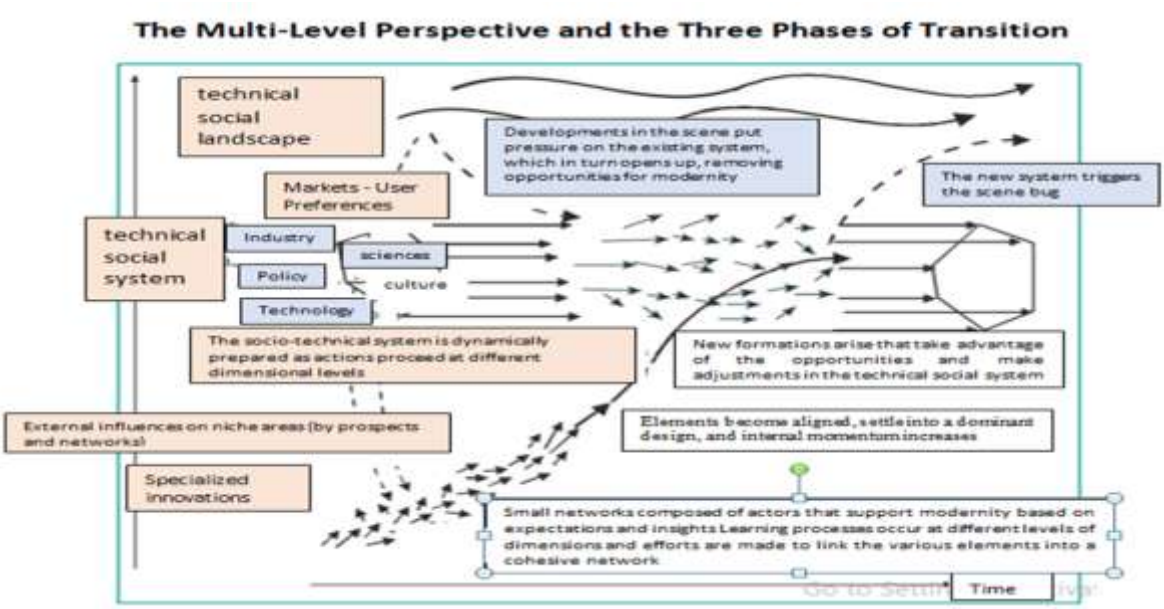

Figure 5. *The multi-level perspective and three phases of transition*

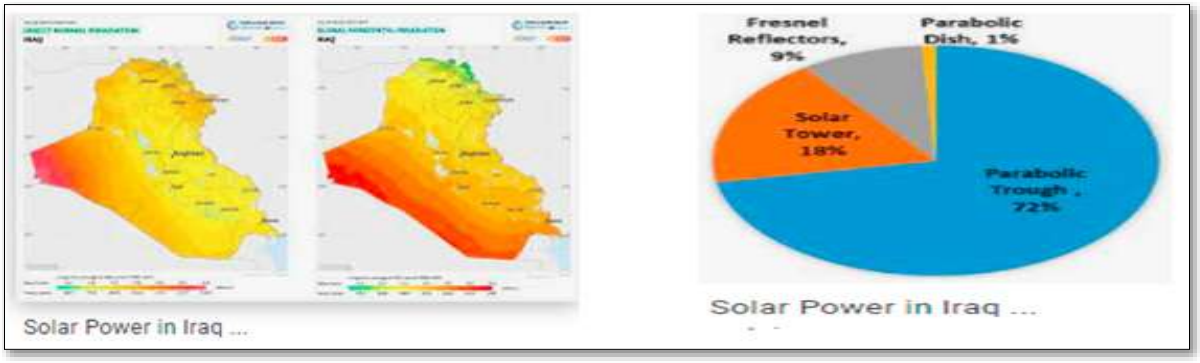

Figure 6. *solar power in Iraq[https://www.google.com/search?q=iraq%20solar%20projects&ved*

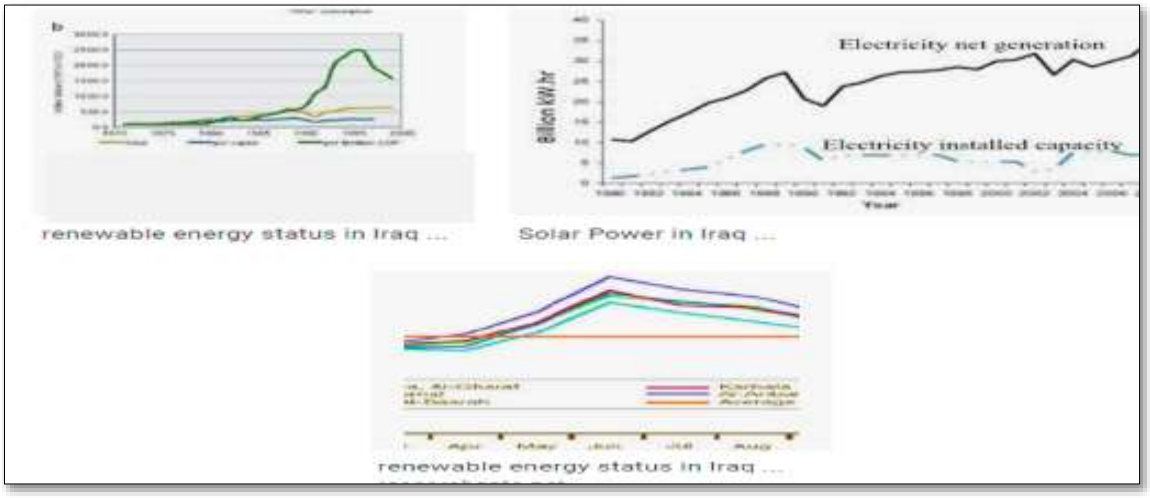

Figure 7. *https://www.sciencedirect.com/science/article/abs/pii/S136403211400478X*

10. Iraq is currently lagging behind its regional competitors in developing renewable energy technologies.

In order for Iraq to become one of the countries that benefited and developed in the application of renewable energy technologies, through.

Through the implementation of the phased model Resource-based energy transition renewable energy in the countries of the Middle East and North Africa over Iraq, and presenting instructions by specialists Contribute to Develop the necessary strategy to direct The process of energy transmission according to established laws and

protocols and according to material and logistical capabilities.

Iraq is currently lagging behind its peers regional energy technology development Renewable and does not have a strategy Specific to develop the energy sector Renewed.

The application of studies to shift towards an energy system Sustainability to help Iraq Securing reliable electricity supply Affordable, and achieve savings costs, and create long-term opportunities for economic and environmental development.

11. We Apply Expertise in Energy Management to Achieve A Low Carbon Society

11.1 Hitachi Sunway Experience

Hitachi Sunway Information Systems Corporation was established in April 2013 as a venture providing information technology services, the Hitachi Corporation and the Sunway Group have jointly advanced in trade and business, and strengthened their relationships through a wide range of areas. In 2015, the two companies launched a joint energy management business, creating a low-carbon community in Malaysia by relying on Hitachi's advanced energy-saving solutions and optimizing energy use across the board. Including "providing energy for the university and college, and studying the adoption of an integrated system for energy management in hotels, hospitals and commercial complexes." One of Hitachi's proposals is mall solutions to provide safety and security for the community. These efforts rely on pedestrian flow analysis techniques in marketing operations and techniques and support for security and facial recognition solutions. As an implementation of integrated urban development projects that draw on Hitachi's expertise in energy management in markets, the company strives to develop communities in which people can live in comfort and peace**.** [25]

12. Conclusions and Recommendations

12.1 Conclusions

1. The traditional models of civilized transformation are no longer convenient with the needs of the current era, and they are unsustainable for a population of this large number, and they form a waste of resources and cause severe damage to the environment in view of the progress in the fields of technology and regenerated energy that we are witnessing for decades now. It seems that the only way to visualize the reality of what the future cities will be is through what is referred to as "smart cities".
2. Smart cities are modern cities that have been designed and built in a smart way from the ground up. They are new cities, or a traditional city that has gradually been transformed through development and rehabilitation into a fully smart city by adding modern technologies to it. "Many countries have launched smart city projects, including Dubai, Oman, New York. Tokyo. Shanghai and Amsterdam." Over the next decade, smart. city models are. expected to become widespread, and these models, will form the ground rules for city, development plans
3. ,Smart cities are those that reduce greenhouse gases significantly by ensuring that new buildings are carbon-free by 2030.
4. Cities are quickly becoming smart cities, including energy, technology, infrastructure, movement, construction, healthcare, governance, education, homes and the citizens themselves.
5. The future smart cities rely on electric energy basically to run almost everything, and it is no longer acceptable or logical for these modern cities to derive the necessary electric power from traditional fossil fuel sources, which are limited and harmful to the environment.
6. The use of clean energy sources and environmentally friendly means of transportation is one of the essential elements to reduce greenhouse gas emissions.
7. As a result of the spread of regenerated energy technology that is used to run electric cars within smart cities, as well as solar energy storage panels on rooftops and buildings, and energy storage technology in batteries, a new type of customer is generally known as the "producer consumer" has appeared.
8. During the past 20 years, engineers have developed various types of organic building materials, which are distinguished by different degrees of permeability. Mycotecture, that is, architectural building blocks consisting of fibrous materials in fungal roots, as strong as concrete and insulating as "fiberglass".
9. Iraq is currently lagging behind its regional rivals in developing regenerated energy technologies and does not have a specific strategy for developing the regenerated energy sector.
10. Applying the German energy system in its four stages to the Middle East region, including Iraq.

12.2 Recommendations

1. Moving to the use of environmentally friendly means of transportation, which are featured by the absence of harmful emissions to the environment.
2. Transition to the use of environmentally friendly means of transportation that are characterized by zero emissions that are harmful to the environment.
3. Shift towards a sustainable. Energy system in Iraq to help secure. a continuous and affordable supply of electricity, achieve cost savings, and create long-term opportunities for economic development..
4. Encouraging positive environmental change.
5. Integrating technology into all aspects of design, construction, performance monitoring to maintenance.
6. Expanding green spaces.
7. Reducing traffic jams and congestion points..
8. Effective access to facilities with minimal waste.
9. Introducing techniques and technology in all aspects of the city and in elaborate details.
10. spending efforts to develop communities in which people can live comfortably and peacefully.

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