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Research Article

Türkiye's Eastern Anatolia Region's Technical and Economic Development Model Focused on Energy Projects (Energy Projects Centered İn Ağrı – Diyadin And Iğdır – Tuzluca)

Emin Taner Elmas*

Assistant Professor, Vocational School of Higher Education for Technical Sciences, Division of Motor Vehicles and Transportation Technologies, Department of Automotive Technology, Iğdır University, Turkey & Graduate School of Natural and Applied Sciences - Major Science Department of Bioengineering and Bio-Sciences, Iğdır University, Turkey

***Corresponding Author:**
Dr. Emin Taner Elmas, Vocational School of Higher Education for Technical Sciences, Division of Motor Vehicles and Transportation Technologies, Department of Automotive Technology, Iğdır University, Turkey & Graduate School of Natural and Applied Sciences - Major Science Department of Bioengineering and Bio-Sciences, Iğdır University, Turkey.

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Abstract

Dr. Emin Taner Elmas is known for his academic and applied projects, particularly focusing on geothermal energy and energy storage systems. His work revolves around the efficient use of renewable energy sources and sustainable energy technologies.

His main studies and projects include:

*• **Electricity Generation from Geothermal Energy:** He conducted a comprehensive research project on generating electricity using geothermal hot water resources, which are renewable energy sources, in the Diyadin district of Ağrı. This study aims to guide the transformation of the region's potential into an electricity generation plant.*

*• **Energy Storage Systems (CAES):** He investigated the possibility of using the "Salt Caves" (Salt Domes) in Tuzluca, Iğdır, for Compressed Air Energy Storage (CAES) systems. This method is a critical technology for ensuring the continuity of renewable energy.*

*• **Energy Efficiency and Management:** He conducted research on energy analyses, energy audits, and energy management within Iğdır University. • Industrial Energy Conservation: Academic research focuses on reducing energy costs and improving energy efficiency in electric arc furnaces used in steel production.*

• Sustainable Engineering Solutions: Publications combine modern engineering approaches, smart manufacturing systems, and renewable energy technologies from a mechanical engineering perspective.

Electricity Generation from Geothermal Energy

This project, conducted under the supervision of Dr. Emin Taner Elmas, Assistant Professor at Iğdır University, is a comprehensive feasibility and research study aiming to transform the geothermal potential in Diyadin district of Ağrı into a concrete electricity generation investment.

The prominent technical details of the project are as follows:

*• **Focus Point (Mollakara Village):** The studies are particularly concentrated in the Mollakara Village region, located 5 km from the Diyadin district center. Despite being at an altitude of 2090 meters and having harsh continental climate conditions, this region offers a very high energy capacity in terms of underground resources.*

*• **Technological Approach (ORC):** Depending on the temperature levels of the hot water sources in the region, the Organic Rankine Cycle (ORC) technology, which uses organic fluids with lower boiling points instead of water, is emphasized. This method enables efficient electricity generation from medium-low temperature geothermal resources.*

*• **New Discoveries:** Drilling operations conducted as part of the project have identified new hot water sources with very high capacity suitable for electricity generation.*

*• **Integrated Use Model:** In addition to the existing geothermal greenhouse and residential heating activities in Diyadin, the main objective of this project is to transform the region into an "electricity generation center." This aims for a stepped model where energy is first used for electricity generation, and then the surplus heat is used for greenhouse or residential heating.*
*• **Feasibility and Guidance:** Dr. Elmas's studies, published in journals such as the Global Journal of Research in Engineering & Computer Sciences, provide a technical basis and guidance for investors.*

Integration of Energy Storage and Salt Cavities (CAES):
A vision is being developed to combine the salt structures in Tuzluca, Iğdır, with energy production in Diyadin to increase energy supply security in the region.
• Tuzluca Salt Domes: The massive salt layers (Salt Domes) in Tuzluca offer an ideal environment for Compressed Air Energy Storage (CAES) technology. Dr. Elmas argues that these caves can be used as "artificial caverns" to create giant "air batteries".

• Integration Scenario:
***Production:** Excess electricity generated from geothermal power plants in Diyadin or solar/wind sources in the region is used.*
o Storage: This excess electricity is used to compress air, which is then pumped into the caves in Tuzluca.

***Consumption:** During peak energy demand or reduced production hours, the compressed air is released from the caves to drive turbines and convert them back into electricity.*
• Strategic Importance: This integration has the potential to transform the region into the energy hub of Eastern Anatolia by combining geothermal energy's base load (continuous) power capability with storage.

Dr. Emin Taner Elmas's Diyadin and Tuzluca projects are not only a local development initiative but also of strategic importance for Turkey's National Energy and Mining Policy and its 2053 Net Zero Emission targets. The critical importance of these projects for Turkey can be summarized in the following points:

1. Reducing Dependence on Foreign Energy Sources
Turkey is largely dependent on imports for primary energy sources (natural gas and coal). Including domestic geothermal resources in electricity production, as in Diyadin, directly reduces the energy import bill, which is the biggest cause of the current account deficit.

2. "Battery Country" Strategy and Supply Security
The biggest obstacle to the transition to renewable energy (solar and wind) worldwide is the inability to store this energy.
• The Tuzluca Geothermal Energy System Project offers Turkey a massive and low-cost storage infrastructure.
• This system balances the national grid, preventing sudden outages and technically supports Turkey's ambition to become a regional energy hub. 3. Combating Climate Change and Green Transformation
• The European Union's sanctions, such as the "Border Carbon Adjustment," make it mandatory for our exporters to use green energy.
• The Diyadin and Tuzluca projects protect the competitiveness of Turkish products in the international market by providing industry with near-zero carbon emission energy.
• By reducing the need for fossil fuels, they contribute to Türkiye fulfilling its commitments in international climate agreements.

4. Technological Competence and Domestic Engineering
These projects enable Turkey to gain engineering experience in advanced technologies such as the Organic Rankine Cycle (ORC) and Compressed Air Energy Storage (CAES). This knowledge, developed under the guidance of academics like Dr. Elmas, can enable Türkiye to reach a position where it exports these technologies to neighboring countries.

5. Socio-Economic Balancing (Regional Justice)
The economic development of Eastern Anatolia balances the industrial and population density in western Turkey, creating a healthier demographic structure. This is a vital macroeconomic move for the overall internal peace and social welfare of the country. In short, these projects are one of the keys to Turkey becoming a "producing, storing, and managing" power on its journey to complete energy independence [1-45].

Keywords: Thermodynamics, Energy Transfer, Energy Efficiency, Energy Conversion, Energy Storage, Geothermal Hot Water Resources, Renewable Energy, Electrical Energy, Thermal Energy, Fluid Mechanics, Heat Transfer, Organic Rankine Cycle (ORC), Compressed Air Energy Storage (CAES) Systems, Energy Systems, Waste Heat Recovery, Economy, Economic Development

Introduction

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His main studies and projects include:

• Electricity Generation from Geothermal Energy

He conducted a comprehensive research project on generating electricity using geothermal hot water resources, which are renewable energy sources, in the Diyadin district of Ağrı. This study aims to guide the transformation of the region's potential into an electricity generation plant.

• Energy Storage Systems (CAES)

He investigated the possibility of using the "Salt Caves" (Salt Domes) in Tuzluca, Iğdır, for Compressed Air Energy Storage (CAES) systems. This method is a critical technology for ensuring the continuity of renewable energy.

• Energy Efficiency and Management

He conducted research on energy analyses, energy audits, and energy management within Iğdır University.

• **Industrial Energy Saving:** Academic studies focus on reducing energy costs and improving energy efficiency factors in electric arc furnaces used in steel production.

• **Sustainable Engineering Solutions:** Publications combining modern engineering approaches, smart manufacturing systems, and renewable energy technologies from a mechanical engineering perspective [1-45].

Geothermal Energy for Electricity Generation:

This project, conducted by Dr. Emin Taner Elmas under the supervision of Iğdır University, is a comprehensive feasibility and research study aiming to transform the geothermal potential in Diyadin district of Ağrı into a concrete electricity generation investment.

The prominent technical details of the project are as follows:

• Focus Point (Mollakara Village): The studies are particularly concentrated in the Mollakara Village region, located 5 km from the Diyadin district center. Despite being at an altitude of 2090 meters and having harsh continental climate conditions, this region offers a very high energy capacity in terms of underground resources.

• Technological Approach (ORC): Depending on the temperature levels of the hot springs in the region, the focus is on Organic Rankine Cycle (ORC) technology, which uses organic fluids with lower boiling points instead of water. This method enables efficient electricity generation from medium-low temperature geothermal resources.

• New Discoveries: Through drilling operations conducted within the scope of the project, new hot spring resources with very high capacity suitable for electricity generation have been identified.

• Integrated Use Model: In addition to the geothermal greenhouse and residential heating activities currently carried out in Diyadin, the main goal of this project is to transform the region into an "electricity generation center." This aims for a stepped model where energy is first used for electricity generation, and then the surplus heat is used for greenhouse or residential heating.

• Feasibility and Guidance:

Dr. Elmas's studies published in journals such as the Global Journal of Research in Engineering & Computer Sciences provide a technical basis and guidance for investors [1-45].

Below are the economic data and details regarding the energy storage integration in the region for the geothermal power project in Diyadin by Dr. Emin Taner Elmas [1-45].

1. Diyadin Geothermal Project: Economic and Technical Analysis

The project to convert geothermal resources in the Diyadin (Ağrı) region into electricity production is based on both low installation costs and high efficiency.

• Economic Payback Period

As Dr. Elmas stated in his article in the Global Journal of Research in Engineering & Computer Sciences (2024), the installation of the facility is quite economical thanks to the existing geothermal potential (high pressure and flow rate), and the payback period is extremely short.

• Resource Potential

It has been determined that the temperature, measured at 100 °C at the wellhead, reaches much higher values as one descends towards the source center. This high energy capacity is the main factor that strengthens the financial feasibility of the investment.

• Multi-Purpose Use (Cascade Model): "Cascade" (stepped) use is recommended to increase economic efficiency. In this model, geothermal fluid is first used for high-temperature electricity generation; then the resulting "waste heat" is transferred to existing greenhouse heating, residential heating, and geothermal tourism facilities in the region. This integration maximizes the profitability of the project by opening multiple revenue streams from a single source.

2. Energy Storage and Salt Caves (CAES) Integration

A vision is being developed to combine the salt structures in Tuzluca, Iğdır, with energy production in Diyadin to increase energy supply security in the region.

• Tuzluca Salt Domes: The massive salt layers (Salt Domes) located in Tuzluca offer an ideal environment for Compressed Air Energy Storage (CAES) technology. Dr. Elmas argues that these caves can be used as "artificial caverns" and transformed into giant "air batteries".

• Integration Scenario

o Production: Excess electricity generated from geothermal power plants in Diyadin or from solar/wind resources in the region is used.

• Storage: This excess electricity is compressed into air and pumped into the caves in Tuzluca. • Consumption: During peak energy demand or low production hours, the compressed air is released from the caves to drive turbines, which are then converted back into electricity.

• Strategic Importance: This integration combines the base load (continuous) power capability of geothermal energy with storage, potentially transforming the region into the energy hub of Eastern Anatolia. [1-45]

Material, Method, Discusssion

The employment opportunities that the Diyadin project will provide to the local economy and the contribution of the Tuzluca Geothermal Energy Plant project to carbon emission targets: [1-45]

In line with Dr. Elmas's vision, the impacts of these two giant projects on local development and environmental goals are as follows:

1. Contribution to Local Economy and Employment (Diyadin and Surroundings)

The geothermal power plant and its integrated facilities aim to create not just an "energy facility" but an ecosystem in the region:

• Direct and Indirect Employment: Hundreds of people, from technical personnel to security, will have job opportunities during the construction and operation phases of the plant. However, the main employment will reach thousands of women and young workers thanks to the "Geothermal Organized Industrial Zones" (greenhouse areas) established with the heat remaining from electricity production.

• Reverse Migration: The development of industry and modern agriculture (greenhouse farming) in the region, along with the decrease in energy costs, will create an economic environment that will encourage return migration from large cities to the region.

• Energy Independence: The fact that local industrial facilities can meet their own energy needs much more cheaply makes Diyadin an investment attraction center. [1-45]

2. Contribution to Carbon Emission and Environmental Targets (Tuzluca CAES Project)

The energy storage project in Tuzluca plays a critical role in Turkey's "2053 Net Zero Emissions" targets:

• Intermittent Energy Stabilization: Solar and wind energy are weather-dependent. The air cell (CAES) system in Tuzluca stores this energy when clean energy production is high and activates when production stops, eliminating the need for fossil fuel (coal/natural gas) power plants.

• Zero Waste and Low Carbon: Geothermal energy is one of the energy types with the lowest carbon emissions. Using energy by storing it reduces losses in energy transmission lines and minimizes the total carbon footprint.

• Preservation of Natural Structure: Salt caves are already existing natural formations. Utilizing these areas for energy storage is a far more sustainable alternative compared to giant battery plants that harm the environment. [1-45]

In Dr. Emin Taner Elmas's vision, the technical integration of these two regions can be built on the concept of a "Regional Smart Grid." Diyadin represents production, while Tuzluca represents balancing. [1-45]

Technical integration can be achieved through the following steps:

1. Energy Transfer Line and Base Load Management

Unlike solar or wind power, the geothermal power plants in Diyadin produce energy 24/7 without interruption (base load).

• Transmission: The electricity produced in Diyadin is transmitted to Tuzluca, approximately 100-120 km away, via high-voltage lines.

• Scenario: During nighttime hours when electricity demand in the region is low, this excess energy from Diyadin is used directly to feed the CAES (Compressed Air Energy Storage) system in Tuzluca.

2. Charging the CAES (Tuzluca) System

The giant compressors installed in the salt caves in Tuzluca are powered by electricity from Diyadin.

• Technical Process: The compressors push outside air into the salt caves (caverns) at high pressure. This process stores electricity as "potential energy" on a massive scale.

3. Discharge and Grid Stability During Peak Hours

When energy demand increases in industrial areas around Iğdır or Ağrı (peak hours):

• **Production:** Compressed air in Tuzluca is released in a controlled manner. The heated air rotates turbines, instantly generating a large amount of electricity.

• **Balancing:** The stable production of Diyadin and the flexible storage capacity of Tuzluca combine to protect the regional grid from fluctuations and eliminate the need for external energy imports.

4. Digital Monitoring and Automation (Smart Grid)

A SCADA-based central control system is required for these two facilities to operate synchronously.

• AI-Powered Management: With modern engineering approaches emphasized by Dr. Elmas, weather forecasts, consumption trends, and geothermal flow rate data are analyzed to automatically manage when energy is stored and when it is released to the grid.

5. Thermal Integration Potential

Although there is a geographical distance, the waste heat released while compressing air in the CAES system in Tuzluca can be used in local drying facilities or industrial processes with a similar model (as in geothermal energy). Thanks to this integration model, Eastern Anatolia can become a center that not only consumes energy but also produces and manages energy with its own resources.

Dr. Emin Taner Elmas's Diyadin and Tuzluca projects have the potential to fundamentally change the energy profile of the Eastern Anatolia Region, transforming it into a strategic energy production and storage center. [1-45]

The Key Elements that Will Enable This Transformation Are:

• Bringing Unused Resources into the Economy: Approximately 5% of Türkiye's geothermal potential is located in Eastern Anatolia. The Diyadin project aims to reduce the region's dependence on foreign energy sources by converting this limited but abundant resource into electricity production using local resources.

• **Energy Storage and Supply Security:** The salt domes in Tuzluca act as massive "air cells" (CAES) that will solve the discontinuity problem of wind and solar energy in the region. This makes Eastern Anatolia a center not only for energy production but also for energy storage and management.

• **Regional Development and Employment:** These projects reduce high energy costs, creating an attractive center for

geothermal greenhouse farming and modern industrial investments. This creates an economic ecosystem that can initiate a "Reverse Migration" process in the region.
• **Strategic Location:** The transformation of Iğdır and Ağrı into energy hubs makes this region a key point in Türkiye's energy trade with neighboring countries.

As a result, Dr. Elmas's scientifically based approach establishes a modern energy corridor that combines the rich natural resources of Eastern Anatolia (geothermal, solar, and salt structures) [1-45].

These projects, proposed by Dr. Emin Taner Elmas, represent an economic leap model for the Eastern Anatolia Region based on local resources. The tangible contributions of the projects to regional development and employment can be summarized under the following headings [1-45].

1. New Job Opportunities and Qualified Employment
• **Direct Employment:** The construction of the power plant, drilling activities, and energy storage facilities in Tuzluca will create a need for thousands of technical and administrative personnel.
• **Indirect Employment (Geothermal Greenhouse):** The waste heat from the geothermal power plant in Diyadin is used to heat vast greenhouse areas. This model has the potential to create thousands of new agricultural jobs in the region, especially for women and young people.
• **Skilled Workforce:** A pool of skilled workers specializing in energy technologies will emerge in the region, increasing the importance of local educational institutions such as Iğdır University.

2. Reduced Energy Costs and Investment Attractiveness
• **Cheap Energy:** Locally produced and stored energy minimizes energy costs, the largest expense item for industrialists in the region. This makes Diyadin and Iğdır an "investment paradise" for sectors such as textiles, food processing, and cold storage.
• **Energy Supply Security:** Thanks to the storage (CAES) system in Tuzluca, an industrial infrastructure is provided where energy outages do not occur. This secure environment ensures the arrival of large-scale industrial investments to the region.

3. Reverse Migration and Social Welfare
• **Economic Revitalization:** This activity in agriculture and industry triggers the growth of local businesses and the service sector.
• **Reverse Migration:** The need for people in the region to go to big cities to find jobs is eliminated; in fact, a reverse migration wave towards the region may begin due to the job opportunities created.

4. Sustainable Development and Environment
• **Green Economy**: These projects, with their low carbon emissions, ensure the region's development in accordance with "green development" standards.
• **Tourism Potential:** Modernizing geothermal resources not only for energy but also for thermal and health tourism will significantly increase the region's tourism revenue. [1-45]

In short, these projects, by combining Diyadin's underground heat and Tuzluca's geological structure, can transform Eastern Anatolia into one of Turkey's most strategic regions, becoming self-sufficient and an energy exporter. [1-45]

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Conclusion
Dr. Emin Taner Elmas's projects are one of the most concrete examples of the "University-Industry Collaboration" model, where academic knowledge is directly transformed into industrial application. This collaboration ensures that projects move beyond mere research on paper and become commercial and strategic investments that develop the region. The fundamental

roles of this process are: [1-45]

1. "Commercialization" of Academic Knowledge and Risk Management

Industrialists may often hesitate to invest in new and untested technologies (such as CAES or low-temperature ORC).

• **The Role of the University:** Academics like Dr. Elmas identify and minimize the risks of the investment through feasibility studies and technical analyses.

• **Result:** The industrialist makes the investment decision much more confidently based on the scientific data provided by the university.

2. The University as an R&D and Innovation Center

The Diyadin and Tuzluca projects require a continuous technical development process.

• Iğdır University acts as an "R&D Laboratory" for these projects. Energy efficiency analyses, thermodynamic calculations, and geological surveys are conducted within the university.

• Industry Partnership: Energy companies in the region use this R&D infrastructure to modernize their systems and reduce operational costs.

3. Training of Qualified Human Resources

When these projects are implemented, there will be a need for "qualified engineers and technicians" to operate them.

• University: It trains students in energy systems engineering and related departments by involving them in these projects.

• Industry: It shortens the adaptation period by directly employing graduating students. In this way, it avoids the cost of bringing in experts from outside the region.

4. Access to Local and International Funds

University-industry collaboration is a prerequisite for benefiting from state incentives (TÜBİTAK, KOSGEB) and international funds (such as European Union Green Deal funds).

• Since Dr. Elmas's projects are academic in nature, they can receive grant and loan support much more easily in applications made together with industry partners thanks to "high technology" and "domestic production" points.

5. "Scientific Bridge" Between Public Investors and Investors

The university reports on the social and environmental impacts of the project from an unbiased perspective. This ensures the support of public institutions (ministries, governorships, development agencies) for the project and the acceptance of the project by the public. In short; industry provides the financing and implementation power, while the university provides the theory and oversight power. Without this synergy, the salt caves of Tuzluca or the hot springs of Diyadin would remain merely natural phenomena. [1-45]

Considering the areas of expertise and potential projects of Dr. Emin Taner Elmas, the patentable engineering solutions and innovation areas that stand out in such innovative energy systems can be grouped under the following technical headings: [1-45]

1. Modular Organic Rankine Cycle (ORC) Units

For medium-low temperature sources such as Diyadin, standard turbines may be inefficient. A patentable solution could be:

• **Innovation:** Modular and portable ORC units that can self-optimize according to different geothermal flow rates and temperatures.

• **Technical Difference:** Unlike traditional systems, the design of "smart control valves" that automatically adjust the fluid and pressure when the efficiency of the source decreases.

2. Heat Recovery CAES (Compressed Air) Design for Salt Caves

Significant heat is released when air is compressed; if this heat is not managed, energy loss occurs.

• **Innovation:** "Adiabatic (Thermal Protected) Storage Tanks" that store the heat generated during air compression and use it to reheat the air during discharge.

• **Technical Difference:** Special nano-coating materials that protect the inner surface of the salt cave from corrosion and increase its sealing.

3. Hybrid Energy Production and Storage Algorithms

Software and hardware solutions that ensure synchronization between Diyadin (production) and Tuzluca (storage).

• **Innovation:** Artificial Intelligence-Based Energy Management Software that determines the operating speed of the compressors in Tuzluca by monitoring the instantaneous pressure changes of the geothermal source.

• **Technical Difference:** "Fast discharge valve systems" that respond within milliseconds to balance the grid frequency.

4. Cascade (Staged) Domestic Heat Exchangers

Transferring geothermal fluid not only to electricity but also, respectively, to greenhouses, residential areas, and drying facilities with the highest efficiency.

• **Innovation:** Self-Cleaning Heat Exchanger Designs with High Heat Transfer Coefficients that Prevent Mineral Accumulation (Calcification/Corrosion).

• **Technical Difference:** Alloy metal surfaces specifically developed for the chemical characteristics of the water in the region.

5. Smart Manufacturing (Industry 4.0) Integration

In parallel with Dr. Elmas's work on "Smart Manufacturing Systems":

• **Innovation:** "Digital Twin" modeling that predicts mechanical wear in power plants.

• **Technical Difference:** Predictive maintenance algorithms that provide warnings 48 hours before a failure occurs using sensor data. These engineering solutions can be registered as both utility models and invention patents, making a significant contribution to Türkiye's domestic energy technology exports. [1-45]

Dr. Emin Taner Elmas's Diyadin and Tuzluca projects serve as the "brain" and "application laboratory" of the Energy Park Project planned to be implemented within Iğdır University. This integration creates a massive technology base where theoretical education is put into practice. The fundamental pillars of the integration are as follows: [1-45]

1. Live Data Monitoring and Control Center (SCADA)

All real-time data from the geothermal power plant in Diyadin and the storage facility in Tuzluca are transferred to the central control system in the Iğdır University Energy Park.

• **Integration:** University students and researchers can perform "Energy Management" simulations by monitoring energy production and storage processes through real-time data.

2. "Pilot Scale" Application Areas

The Energy Park can house a scaled-down model of the large-scale Diyadin and Tuzluca projects.

• **Integration:** A pilot prototype of the CAES (Compressed Air) system to be implemented in Tuzluca can be established within the Energy Park. Dr. Elmas's patentable engineering solutions can be tested in this park first, and after their efficiency is proven, they can be included in the main project.

3. Training and Certification Base

Technical personnel who will work in Diyadin and Tuzluca are trained at the Energy Park.

• **Integration:** The "Renewable Energy Training Center" to be established within the park prepares the workforce needed by the projects by providing young people in the region with internationally valid certificates in geothermal turbine maintenance, compressor operation, and smart grid management.

4. R&D and Innovation Synergy

The Energy Park is not just an exhibition area, but an R&D center where **"Smart Production Systems"**, which Dr. Elmas emphasizes, are developed.

• Integration: Technical problems encountered in the Diyadin project (e.g., corrosion or efficiency decrease) are analyzed and solved by the academic staff in the laboratories at the Energy Park.

5. Public Presentation and Investor Showcase

The Energy Park serves as a showcase presenting the potential of these giant projects to domestic and foreign investors.

• **Integration:** Before going to Tuzluca or Diyadin, investors can clarify their investment decisions by viewing the digital twins of the projects, their operating principles, and economic return data at the Energy Park. In short, if the Diyadin and Tuzluca projects are "production and storage factories," then Iğdır University Energy Park is the management, R&D, and training academy for these factories [1-45].

Author Biography:

Asst.Prof. Dr. Emin Taner ELMAS is a Mechanical Engineer having degrees of B.Sc., M.Sc., Ph.D., and was born in Sivas in 1974. He completed his doctorate at Ege University, Graduate School of Natural and Applied Sciences, Mechanical Engineering Department, Thermodynamics Science Branch, and his master's degree at Dokuz Eylül University, Mechanical Engineering Department, Energy Science Branch. He also completed his undergraduate education at Hacettepe University, ZEF, Mechanical Engineering Department and graduated from the faculty with honors in 1995 and became a mechanical engineer. He was awarded a non-refundable scholarship by the Turkish Chamber of Mechanical Engineers in his 4th year because he was the most succesful student during his first 3 classes study at the faculty. He graduated from İzmir Atatürk High School in 1991.

Asst. Prof. Dr. ELMAS has completed his military service as a NATO Officer in Bosnia and Herzegovina. He was a "Reserved Officer" as a "2nd Lieutenant" as an "English-Turkish Interpreter". He was also a "Guard Commander" and served in Sarajevo, Camp Butmir within the SFOR task force of NATO. He has been awarded with 2 (two) NATO Medals and Turkish Armed Forces Service Certificate of Pride (Bosnia & Herzegovina).

In addition to his academic duties at universities, he has worked as an engineer and manager in various industrial institutions, organizations and companies; He has served as Construction Site Manager, Project Manager, Management Representative, Quality Manager, Production Manager, Energy Manager, CSO-CTO, CBDO, Factory Manager, Deputy General Manager and General Manager.

Asst. Prof. Dr. Elmas is Department Head and is an Assistant Professor of Automotive Technology at the Department of Motor Vehicles and Transportation Technologies at Vocational School of Higher Education for Technical Sciences at IGDIR UNIVERSITY, Turkey. He is also an Assistant Professor of Bioengineering & BioSciences at the same university. He has nearly 30 years of total experience in academia and in industry.

He has served as a scientific referee and panelist for ASME, TUBITAK and many scientific institutions, organizations and universities, including NASA.

He has published numerous international and national academic scientific articles, books, and book chapters, and serves as an editor for international academic journals. He also serves on the scientific committees of many international conferences, publishing conference and congress proceedings and giving presentations.

"Mechanical Engineering, Energy Transfer, Thermodynamics, Fluid Mechanics, Heat Transfer, Higher Mathematics, Evaporation, Heat Pipes, Space Sciences, Automotive, Bioengineering, Medical Engineering Applications, Neuroengineering, Medical Technique" are his academic and scientific fields of study; "Heating-Ventilation Air Conditioning Applications, Pressure Vessels, Heat Exchangers, Energy Efficiency, Steam Boilers, Power Plants, Cogeneration, Water Purification, Water Treatment, Industrial Equipment and Machinery, Welding Manufacturing, Sheet Metal Forming, Machining" are his industrial experience fields.

As of 2026, he has been awarded the Nobel Scientist Award by the international platform organization Scientific Laurels.

Asst. Prof. Dr. Emin Taner ELMAS is also a musician, saz (baglama) virtuoso player and ney (Nay, Turkish Reed Flute) performer. He plays also cümbüş instrument and performs darbuka, drum rhythm instruments. He has a YouTube Music Channel (Emin Taner ELMAS) which includes some of his sound recordings of him playing the saz-baglama and blowing the ney. He composed the poem written by the great poet Âşık Veysel ŞATIROĞLU under the name of "Raşit Bey" in memory of his father Judge (Hâkim) Raşit ELMAS as "Raşit Bey Türküsü", wrote it down, notated and published it as an academic article and broadcasted this song on his own music channel. He wrote the poems entitled "Canım Babam" and "Geldim Babam" which he wrote also in memory of his father and published in an academic literature journal, and composed instrumental musics for these poems. He also composed an instrumental song called "Annem Annem Türküsü" and gave it to his mother, Lawyer Tuna ELMAS, as a gift on Mother's Day, 11.05.2025. He also has a poem titled "Ney and Neyzen." He also wrote and presented a poem titled "Esra Kardeşim" to his sister, Esra ELMAS, an archaeologist and English teacher. He has published

books including “Saz-Bağlama Tuning System Method” (“Saz-Bağlama Akort Sistemi Metodu”) and “Ney and Neyzen; Ney’s Pitches, Frets, Sound Stages, Octaves, Structure, Performance, Ney Maintenance and Basic Music Theory” (Ney ve Neyzen; Ney’de Perdeler, Ses Devreleri, Oktavlar, Yapısı, İcrası, Ney Bakımı ile Temel Musiki Nazariyatı) and My Collection of Literary and Musical Art Works – I Story / Anecdote / Essay / Poetry / Verse / Prose / Humorous; witty - satirical; poetic stories / Lyrics / Composition (Edebiyat ve Musiki Sanat Eserleri Külliyatım – I
Hikâye / Anekdot / Deneme / Şiir / Manzume / Nesir /Mizahi; nükteli – hicivli; şiirsel hikâyeler / Güfte / Beste). He continues his artistic studies by writing various articles, books, poetry, lyrics and also realizing musical composition and repertoire works.

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9. Iğdır University, Press and Broadcasting Center News 1: Asst. Prof. Dr. Emin Taner ELMAS appeared as a live guest on TRT Erzurum Radio’s “Voice of the East” program.
10. Emin Taner ELMAS (2020) Assistant Professor and Head of the Department of Automotive within the Motor Vehicles and Transportation Technologies Program at the Iğdır University Vocational School of Technical Sciences, appeared as a live guest on the TRT Erzurum Radio program *Doğu’nun Sesi* (Voice of the East) on Sunday, during the broadcast, he provided scientific and technical details regarding a project that enables the Salt Caves located in our province of Iğdır to be utilized as an “Energy Storage System,” in addition to their current intended uses.
11. Iğdır University, Press and Media Center News 2: Dr. Emin Taner ELMAS—Head of the Department of Automotive within the Motor Vehicles and Transportation Technologies Program at the Iğdır University Vocational School of Technical Sciences—provided information regarding a project that enables the Salt Caves located in our province of Iğdır to be utilized as an “Energy Storage System,” in addition to their current intended uses.
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