

Demand side management in energy strategies and politics

Cristina Țărean, Tiberiu Rusu, Tudor A. Rusu

Technical University of Cluj-Napoca, Department of Environmental Engineering and Sustainable Development Entrepreneurship, Romania. Corresponding author: C. Țărean, cristinatarean@yahoo.com

Abstract. The article approaches the concept of Demand Side Management presenting general notions applicable in the energy field. Analysis of Demand Side Management concept wanted to show the need for correlation between the Romanian Energy Strategy with National strategy on energy efficiency and the National Strategy for Sustainable Development. This paper presents the tools available and benefits to consider this concept in the development and updating of strategies and energy policies.

Key Words: Demand Side Management, energy, energy efficiency, utilities.

Introduction. Demand Side Management (DSM) concept has been developed and successfully implemented the first time in the United States since 1980 and then in other parts of the world such as Europe.

According to the U.S. Department of Energy, Demand Side Management is action taken in the consumer side, after the meter, to change the amount or timing of energy consumption. Utility DSM programs offer a variety of measures that can reduce energy consumption and consumer spending power. Electricity DSM strategies designed to maximize the efficiency of end users to avoid or postpone the construction of new generation plants (www.ieadsm.org).

DSM programs consist of the planning, implementation and monitoring activities of electric power, which are designed to encourage consumers to reduce the demand for energy (conservation) and to change the electricity consumption behaviour (peak periods to off-peak periods, load management). The "Negawatthour" (NWh) was made the conceptual alternative to the Megawatthour (MWh) (www.ieadsm.org). These measures motivated by a concern for resource optimization.

The benefits of DSM programs to consumers, businesses, utilities and society are:

- reductions in customer energy bills;
- reductions in the need for new power plant, transmission and distribution networks;
- stimulation of economic development;
- creation of long-term jobs due to new innovations and technologies;
- increases in the competitiveness of local enterprises;
- reduction in air pollution;
- reduced dependency on foreign energy sources;
- reductions in peak power prices for electricity.

Romania has developed Energy Strategy for 2007-2020, updated in 2011, but in the year 2014 is overcome by lack of medium and long term vision. This paper aims to present the applicability of the concept of Demand Side Management in the energy sector and its benefits.

Demand Side Management in energy sector in Romania. There were a number of scientific events, since the '90s, in the purpose of transfer the knowledge and information about methodologies IRP (Integrated Resources Planning) and DSM used in countries with tradition.

DSM measures were applied unsystematically long time, including in Romania, since the time of national power system development. The actions were influenced by the overall organization of the economy and political factors (Constantinescu & Rugina 1995).

To expand production - transmission - distribution capacity requires a period of several years which has an effect on invested capital due to uncertainty regarding the evolution of energy demand, the price and the technology.

Efficient energy management to final consumers (DSM) is a service dedicated by energy supply and distribution companies in order to achieve energy savings as an alternative to upgrading or replacing capacities (e.g.: distribution networks development). Energy services should be viewed by suppliers as an opportunity to change the old sales model energy by switching from selling a product to selling a service (Cruceru et al 2007).

As any economic activity, the DSM measures efficiency should result in cost/benefit ratio (Indre & Manea 1995). Costs for implementing DSM measures are recovered from energy bill savings and avoided costs of power supply system.

DSM technologies are of great diversity among which the most promoted are:

- flatten load schedule of power system. Both direct regulation (by the supplier) and indirect (by consumers) rely on resources given from energy pricing mechanism;
- increased efficiency in energy use by applying advanced technologies and change consumption behaviour.

One objective to achieve energy efficiency targets should be to promote DSM type actions.

Sustainable energy development is ensured through a policy focused on energy efficiency, which aims interrelated goals of increasing competitiveness of production, transportation and distribution of energy, to ensure safety of supply sources and environmental protection.

Development of energy management programs (Demand Side Management) ensure reduce the pressure on energy resources, including on imports of primary energy resources, improving energy management (through the introduction of energy consumption modern tracking and production processes automating, large consumers of energy and fuels), more efficient use of energy and delaying investments in new power generation capacity.

In 2013, in the "Energy Efficiency Conference - essential component of energy policy. Policies and technologies, (Bucharest)" (Leca 2013), has been discussed about incentives for utilities providing power in order to promote efficient investment at energy consumers. It is recommended to promote ESCO programs (Energy Service Company), DSM, energy audits, voluntary agreements, changing regulations. EE cost (Energy Efficiency) to consumers is usually less than the investment in a new production capacity.

These discussions show that these methodologies have not reached the level of implementation in Romania.

DSM measures have an impact on (<http://africa-toolkit.reeep.org>):

- cost reduction and environment:
 - reduce utility costs/customer costs,
 - rising fuel prices,
 - opposition/financial limitation to building new plants,
 - emission/environmental concerns;
- network and market:
 - delay or avoid expansion,
 - competition,
 - demand shifting,

Program to reduce energy demand through processes, buildings or equipment (<http://africa-toolkit.reeep.org>) more effective is a DSM measure that can be implemented by:

- improving performance of systems and used technology etc.;
- efficient lighting:
 - CFLs,
 - using natural light;

- equipment labelling;
- building regulations:
 - efficient and alternative energy use;
- efficient use of electric motors;
- preventative maintenance;
- energy management:
 - energy purchasing,
 - metering and billing,
 - performance measurement,
 - energy policy development,
 - energy surveying and auditing,
 - awareness-raising, training and education,
 - capital investment management;
- hiring an energy planner;
- housekeeping:
 - no cost/low cost measures,
 - measures requiring some level of investment;
- energy auditing:
 - preliminary audit,
 - detailed audit,
 - financial analysis.

Several DSM measures that may be applied Network Load Management are:

- on the level of network load by changing the curve and moving the peak consumption;
- on the control level loading through on / off remotely controlled, smart meters (Smart Metering);
- incentive or penalty tariffs.

To develop and implement DSM programs in any sector can approach the following strategy:

- identification of sectors and end users as potential targets;
- determination of industry needs;
- developing a customized program;
- making cost - benefit analysis;
- prepare implementation plan for the program;
- implementation of the program;
- results monitoring and preparation of DSM studies;

The following stakeholders could participate in implementing DSM programs:

- utilities;
- regulators;
- national, local and regional administrations and agencies;
- industry and trade associations;
- system operators;
- customer organizations and larger customers;
- universities;
- research bodies;
- journalists;
- NGOs.

Conclusions. In the 21st century with the imperative need to create sustainable energy systems in order to prevent climate change and at the same time to ensure more safety for people, DSM must be re-invented as a tool. Demand Management programs play an important role in mitigating the emergency in the electrical system, avoiding blackouts and increase system reliability, reduce dependence on imports, reduce energy prices, helping grid and power plants generation, avoiding large investments in generation, transmission and distribution to protect the environment and not least the integration of renewable energy resources.

References

- Constantinescu J., Rugina V., 1995 Soluții de aplicare a măsurilor DSM în sistemul energetic din România. *Energetica* 1B:21-26 [in Romanian].
- Cruțeru M., Paliță V., Răcoceanu C., Diaconu B., 2007 Gestiunea energiei – soluție eficientă pentru protecția mediului ambient. *Analele Universității „Constantin Brâncuși”*, Târgu Jiu, Seria Inginerie 1:97-102 [in Romanian].
- Indre G., Manea D., 1995 Demand Side Management – pro și contra. *Energetica* 1B:11–16 [in Romanian].
- Leca A., 2013 Eficiență energetică – soluție importantă de redresare economică a României. Conferința: Eficiență energetică – componentă esențială a politicilor energetice. *Politici și tehnologii (Ediția XII)*, București [in Romanian].
- *** International Energy Agency Demand Side Management, Strategic Plan for the IEA Demand Side Management Programme 2008-2012, www.ieadsm.org (accessed in 14 January 2014).
- *** Renewable Energy & Energy Efficiency Partnership Africa, Module 14: Demand Side Management. <http://africa-toolkit.reEEP.org/> (accessed in 13 January 2014).

Received: 04 February 2014. Accepted: 20 February 2014. Published online: 31 March 2014.

Authors:

Cristina Jărean, Technical University of Cluj-Napoca, Faculty of Materials and Environmental Engineering, Department Environmental Engineering and Sustainable Development Entrepreneurship, 103-105 Muncii Ave, 400641, Cluj-Napoca, Romania, e-mail: cristinatarean@yahoo.com

Tiberiu Rusu, Technical University of Cluj-Napoca, Faculty of Materials and Environmental Engineering, Department Environmental Engineering and Sustainable Development Entrepreneurship, 103-105 Muncii Ave, 400641, Cluj-Napoca, Romania

Tudor Andrei Rusu, Technical University of Cluj-Napoca, Faculty of Materials and Environmental Engineering, Department Environmental Engineering and Sustainable Development Entrepreneurship, 103-105 Muncii Ave, 400641, Cluj-Napoca, Romania

This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

How to cite this article:

Jărean C., Rusu T., Rusu T. A., 2014 Demand side management in energy strategies and politics. *Ecoterra* 11(1):8-11.