EXECUTIVE SUMMARY OF KEMA STUDY ON

PRINCIPLES FOR DESIGNING AN ENTRY-EXIT TARIFF SYSTEM

Project Background

In order to implement the requirements of the Third Package of the EC, Austria amended the Natural Gas Act, the Gas Market Model Ordinance and the related rule settings. An essential element of the reform process is the establishment of transmission access based on the entry-exit model.

The main objective of this project is to assess the principal options for designing an entry-exit tariff system in line with EU and national legal framework and to provide recommendations for its implementation in Austria. The recommendations developed by KEMA take into consideration the conceptual properties of different options, international experience and the current arrangements in Austria. In addition, KEMA supported the consultation process between ECA and sector stakeholders.

The project work commenced in October 2011, shortly before the new Natural Gas Act was adopted. As the new Natural Gas Act sets out several specific provisions with respect to the future design of the Austrian entry-exit system, our recommendations concern the amended legal framework. Accordingly, where the fundamental design of certain features is legally prescribed we focus on specific details related to the practical implementation. In this way, the report strikes a balance between the requirement to comply with the existing legal provisions and the need to develop further details or to suggest solutions in the cases where the Natural Gas Act is not sufficiently specific.

The Austrian gas market consists of three market areas: Vorarlberg, Tirol and Ost. At present high-pressure transmission infrastructure exists only in the market area Ost. Thus, the establishment of an entry-exit tariff system is for the time being limited to this market area. The transmission networks in the market area Ost are owned by three different transmission system operators:

- Baumgarten-Oberkappel Gasleitungsgesellschaft mbH (controlled by OMV, GDF Suez und E.ON) owns West-Austria-Gasleitung
- Trans Austria Gasleitung GmbH (controlled by Cassa Depositi e Prestiti und OMV) owns Trans-Austria-Gasleitung
- Gas Connect Austria owns the remaining part of the transmission system.

Different tariff systems are used for border-to-border transport (transit) and domestic supply.

The current transmission tariffs are distance dependent and reflect the cost of contracted path to transport gas. The tariffs are set by the TSOs in accordance with methodology

endorsed by ECA and by using a long-term financial model. The TSOs offer standard firm capacity and also interruptible and backhaul products.

Entry-Exit Model

Under the entry-exit model, capacity contracts for input and withdrawal are separated and independent of one another - there is no linked contract path. Service entitlement is to bring gas into the system (entry capacity) or to remove gas from the system (exit capacity), and such services can be obtained by the same or different network users.

As a result of this, network users neither need to specify a specific transmission path nor distance, but solely the network points they intend to use for entry and exit into/out of the system. In addition, a virtual trading point assures that the entry and exit points are truly independent from each other, as network users are allowed to transfer gas at this virtual point. A network user that has only contracted entry capacity could sell gas at the virtual trading point, whereas network users who only have access to exit capacity can buy this gas.

TSOs can offer various transmission capacity products. When the capacity is sold as a firm service, the network operator must guarantee that the transmission capacity sold to the network user is always available to the network users. In the case of interruptible transmission capacity, the network operator can interrupt the network user's flow when the network situation does not allow for this flow.

Interruptible capacity can also be offered to network users as non-physical backhaul service. The principle of backhaul is that capacity is sold at an entry or an exit point in the opposite direction of the dominant (forward) flow. This implies that backhaul capacity is usually sold as non-physical and on an interruptible basis as the physical forward flow cannot be guaranteed by the system operator.

Finally, capacity products can be sold for different durations. Generally, when referring to transmission capacity products, annual products are meant. Therefore a distinction can be made between long-term and short-term products in which long-term products are generally defined as contracts of one year or longer and short-term products are shorter than one year and can be down to one day.

International Experience

We studied the entry-exit systems of six selected countries: Belgium, Czech Republic, France, Germany, Italy and the Slovak Republic.

We identified the following design features characterizing common practice in the countries studied:

- Tariffs are based on regulated revenues and regulatory arrangements include incentive schemes
- A freely accessible virtual trading point aiming to enlarge market areas is an important part of the entry-exit tariff systems
- At present, the first-come-first-served principle is predominantly used for primary capacity allocation, however in line with EU legal requirements auctions are gaining increasing importance
- Tariffs are charged on booked capacities, in some cases a commodity charge is used but usually to cover fuel gas cost
- Tariffs at cross-border points are typically locationally differentiated whereas domestic exit tariffs are integrated into (uniform) pricing zones
- In line with EU legal requirements TSOs offer standard capacity services on a firm and interruptible basis, and with long and short-term duration; backhaul services are offered as non-physical products if physical reverse-flow is not possible; capacity services with restrictions of free allocability are offered only rarely.

Recommendations on Cost Allocation and Tariff Setting

In an entry-exit tariff system, as mandated by the Third Package, each network point is priced by an individual tariff and network users can book capacity as long as it is available. The concept of cost-reflectivity forms the basis of the tariff setting and cost-reflective in this context means that the charges for a unit of booked capacity reflects the cost the TSO incurs to ensure reliable transport from any entry to any exit point.

In order to provide adequate price signals, we suggest jointly pricing the three transmission systems in the market area. The allowed revenues of the three TSOs will be added and then converted into transmission tariffs in several consecutive steps explained below. The suggested approach for setting integrated tariffs for the whole market area requires an explicit inter-TSO compensation mechanism. This mechanism aims to ensure the revenue recovery of each TSO. However, the collection of revenue from transmission charges remains the responsibility of the TSOs.

The pricing starts with the specification of the allowed revenue of the network operators. The allowed revenue should cover efficient operation and maintenance, and capital cost including depreciation and return on assets.

In a next step, we prepare a simplified topology of the gas transmission network including the primary components. Based on this topology we define pipeline sections. The sections are chosen in such a way that they closely represent the actual path of the gas flows in the

network. The location of compressor stations and/or network branches is considered to define the different network sections.

The third step is to allocate the corresponding revenue shares to the pipeline sections. The allowed revenue is allocated to the different pipeline sections by using a key based on their replacement value. This removes potential differences in network charges due to the age of assets and supports price stability.

Subsequently the unit costs of each pipeline section are calculated by dividing the revenue allocated to the respective section with the section flows (represented by booked quantities). The unit costs for each entry-exit combination are used to assemble a unit costs matrix. The unit cost matrix has as many rows as exit points and as many columns as entry points. The values in this matrix are the sum of the individual unit cost of the different pipeline sections that are used for transporting one unit of gas from the respective entry to exit point. Thus, for each of these combinations the total sum of the unit costs incurred when using the associated transmission route from the respective entry to exit are calculated.

In the fifth step we determine entry and exit tariffs. The entry and exit tariffs should reflect the values of the unit cost matrix as close as possible, i.e. the sum of the tariff at a particular entry point and the tariff at a particular exit point should equal as close as possible the corresponding value in the unit cost matrix. This is achieved by an optimization algorithm which minimizes the sum of the least squared differences between the values of the unit cost matrix and the sum of the corresponding entry and exit tariffs.

Finally, in a sixth step, we undertake supplementary tariff adjustments in order to reduce the transition impact, to strengthen the acceptance and support the affordability of the pricing reform. These adjustments are implemented by adding constraints in the mathematical model.

Recommendations on Capacity Product Portfolio and Tariff Structure

The portfolio of capacity products and the respective tariff structure are largely pre-determined by the existing legal framework and the network codes which are currently discussed at EU level.

Capacities have to be offered on a firm and interruptible basis, and as short-term and long-term products. For short-term capacity products a share of at least 10% should be reserved. Charges for short-term capacity should be calculated by pro-rating the charges of annual capacity. At present we do not favour the use of seasonality factors, however they may be considered at a later stage.

The interruptible capacities should be offered at discount which ideally represents the probability of interruption at each point where interruptible capacity is offered. We suggest classifying interruptible capacities in groups and offer them with different interruption

probability and corresponding discounts, in particular when high demand of such capacity is expected. If the probability of interruption is rather low, the price for interruptible capacities will likely converge to the price of firm capacity.

Transmission charges can be set on transported gas volumes (commodity charges) or on contracted capacity (capacity charges). In compliance with the Natural Gas Act we propose a tariff structure based solely on capacity charges. Entry and exit charges at cross-border points are geographically differentiated, in order to provide adequate signals for efficient use and extension of the network. With geographical differentiation, different charges are imposed depending on the geographical location of the connection point at which capacity is booked. For domestic exits from the transmission system we suggest using a pricing zone with uniform charges. A similar approach is also suggested for storage points and entry points from domestic production. These should be complemented by (shallow) connection charges to account for the direct connection cost of storage and production facilities.

The suggested solution takes into consideration the network structure and the dominance of the transited gas volumes in the Austrian system. It aims to reduce the impact on the existing tariffs and the competitive position of the network users, and in this way to improve the acceptance and support the transition towards the new pricing regime. Similar methods have been implemented in the majority of the countries studied in this report.

Recommendations on Primary Capacity Allocation

The capacity allocation describes the overall booking mechanism and the way in which network users' requests for capacity are treated. The choice of an adequate capacity allocation mechanism is decisive for the efficient outcome of the process, in particular in cases where capacity is scarce.

There are several capacity allocation methods including first-come first-served (FCFS), pro-rata and auctions. In light of the actual developments in EU legal framework, auctions should be used for primary capacity allocation. Auctions provide a mechanism to allocate capacity in an economically efficient way. We suggest using explicit ascending price-volume auctions for annual, quarterly, monthly and daily capacity products, which is in line with the current provisions of the ENTSO-G Network Code.

Auctions will be supported by reservation prices set at the level of regulated network charges. With respect to long-term capacity products network users will pay the respective regulated network charges and an auction premium determined at the time of capacity auctioning.

Potential revenue surpluses resulting from auctions should be used to alleviate network congestions.

Recommendations on Measures to Increase Capacity

In order to increase the amount of firm capacity, the TSOs can commit load flow commitments or capacities with restricted free allocability. Such measures should be applied in a non-discriminatory way and restricted to the extent necessary to increase firm capacities. Moreover such measures should be proved to be effective, by the TSOs. Capacities with restricted free allocability should be offered at discounted charges compared to the products with freely allocable capacity.

In order to ensure that TSOs procure load flow commitments efficiently, E-Control can either scrutinise and directly allow the procurement cost, or apply conduct regulation using tenders. In the latter case, E-Control should define the tender requirements including size, duration, announcement period etc.