2 Production Constraints and Prospects

This chapter deals with the problems, constraints and economic prospects of the FSU’s fuel supplies. The analysis is restricted to the three major fuels, with the main emphasis on oil and natural gas. We pursue the inquiry in the following order: Section one examines the physical and technological constraints on fuel extraction. This section also establishes the linkage between these constraints and the cost of and prospects for future extraction. Section two deals with the economics of FSU fuel production, projects the probable shifts in costs and relates them to our scenarios. Section three places the issues into the institutional and socio-political context. Fuel production under the different scenarios will be subject to constraints and disturbances of a socio-economic nature. It will also be influenced heavily by perceptions of national interest.

In the first two sections the three fuels are examined in turn because they are subject to very different and uneven limitations of the geological base, geographic environment and available technology. In Section 2 we find it essential to treat the export dimension separately in the case of natural gas. The technological and geographic rigidity of gas exports, the very high up-front investment required in the case of distant gas supplies, and the long-term commitment that these factors imply explain that special treatment.

2.1 PHYSICAL–TECHNOLOGICAL CONSTRAINTS

Given the time horizon of the year 2005, these constraints are shaped by (a) the volume, area distribution and geographic accessibility of proved recoverable reserves; (b) the quality of those reserves and the reservoirs that hold them; (c) addition to reserves in new fields accessible for development by 2005. Cumulative past production by province, and the extent, volume and character of the sediment are also relevant since they affect the distribution of remaining reserves by field size and well flows, both critical components for lead times, investment needs and future costs.
Geology and geography severely affect oil and coal extraction. For natural gas no reserve bottleneck exists. However the effects of reserve degradation from rash production practices have emerged even in the case of gas, while new gas fields will be more difficult to exploit. The physical constraints on the gas industry operate chiefly via transport and distribution costs, investment requirements and lead times.

It is impossible to construct a neat table of physically determined ceilings on output levels for the three fuels. Yet some broad quantitative statements can be made concerning feasible, but not necessarily economic, levels of extraction. These estimates are hazarded at the outset for each fuel.

2.1.1 Crude Oil

2.1.1.1 Estimated Physical 'Ceiling' on Oil Extraction: 550 million tons

The feasible level of oil production in the FSU up to 2005 'permitted' by the resource base may be gauged from the following physical-technical indicators: (a) a time series of four decades of well flow, and forecasts by Russian experts beyond 2000; (b) depletion of 62 per cent of high flow reserves in Russia's producing fields; (c) the size distribution of Russia's discovered deposits, 90 per cent of which held initial reserves of less than 30 million tons, with almost 80 per cent falling below 10 million tons. Soon after 2000, average well yields in the FSU will be no more than four tons per day.\(^1\) A 550 million tons yearly extraction level would demand almost a tripling of the well stock early next century, and in far more scattered locations than in 1990. In that year one fifth of all wells were located in just five fields.\(^2\) Significantly the latest Soviet oil minister claims that FSU reserves could make possible this level of extraction (Churilov, 1991, p. 4).

2.1.1.2 Reserves: Geographic Distribution and Size

Ninety-four per cent of cumulative extraction in the FSU has taken place in the European regions, the Caucasus and West Siberia (Map 2.1).\(^3\) Per square kilometer of sedimentary basins, two thirds more oil was produced from these provinces than from those of the US, including onshore Alaska. Similarly West Siberia, which had no oil industry until the mid-1960s, produced two thirds more per square kilometer of sedimentary deposits than did continental US.\(^4\) Extraction on such a massive scale has drastically affected the size distribution of the remaining reserves and well yields in petroleum reservoirs.