

1st stage

$$\begin{aligned} \min_{x_0, x_1, \dots, x_s} \quad & \frac{1}{2} f_{Q_0}(x_0) \\ \text{subject to} \quad & c_{B_0}(x_0) \geq b_0 \\ & l_0 \leq c_{D_0}(x_0) \leq u_0 \end{aligned}$$

$$\begin{aligned} -R\min_i &\leq y_{t,i}^{\text{Pg}} - y_{t-1,i}^{\text{Pg}} \leq R\max_i \\ y_{t,i}^{\text{Pg}} &= x_{t,i}^{\text{Pg},c}, \end{aligned}$$

$$\begin{aligned} \min_{x_0, x_1, \dots, x_s} \quad & \frac{1}{2} f_{Q_i}(x_i) + \frac{1}{2} x_i^\top f_{R_i}(x_0, x_i) \\ \text{subject to} \quad & c_{A_i}(x_0) + c_{B_i}(x_i) = b_i \\ & l_i \leq c_{C_i}(x_0) + c_{D_i}(x_i) \leq u_i \end{aligned}$$

scenario 1

$$\begin{aligned} \min_{x_0, x_1, \dots, x_s} \quad & \frac{1}{2} f_{Q_i}(x_i) + \frac{1}{2} x_i^\top f_{R_i}(x_0, x_i) \\ \text{subject to} \quad & c_{A_i}(x_0) + c_{B_i}(x_i) = b_i \\ & l_i \leq c_{C_i}(x_0) + c_{D_i}(x_i) \leq u_i \end{aligned}$$

scenario 2

$$\begin{aligned} \min_{x_0, x_1, \dots, x_s} \quad & \frac{1}{2} f_{Q_i}(x_i) + \frac{1}{2} x_i^\top f_{R_i}(x_0, x_i) \\ \text{subject to} \quad & c_{A_i}(x_0) + c_{B_i}(x_i) = b_i \\ & l_i \leq c_{C_i}(x_0) + c_{D_i}(x_i) \leq u_i \end{aligned}$$

scenario 3