Method 1 and Method 2, representing different carbon pricing methods adopted in the paper for comparison, are presented below for your convenience.

$$\begin{split} &\operatorname{Model of TNO \; (Method \; 1):} & \operatorname{Model of PDNO \; (Method \; 1):} \\ &\min_{f \in \mathcal{L}, F_{o}^{c}} C_{\operatorname{users}} = \sum_{a \in A_{\mathbb{R}}} (\omega t_{a} + \phi \varepsilon_{a} l_{a} / 10^{6}) x_{a}^{\operatorname{g}} & \min_{C_{\operatorname{PDNO}}} C_{\operatorname{DNO}} = \sum_{j \in B} \left[ a_{j} (p_{j}^{\operatorname{g}})^{2} + b_{j} \cdot p_{j}^{\operatorname{g}} \right] \\ &+ \sum_{a \in A_{\mathbb{R}}} \omega t_{a} x_{a}^{e} + \sum_{a \in A_{\mathbb{C}}} (\omega t_{a} + \lambda_{a}^{\operatorname{M1}} E_{\operatorname{B}}) x_{a}^{e} & + \kappa \sum_{j \in \pi(0)} P_{0j} + \phi \left( \sum_{j=2}^{|\operatorname{B}|} p_{j}^{\operatorname{g}} \rho_{j}^{\operatorname{g}} + P_{0j} \rho_{j}^{\operatorname{g}} \right) \\ s.t. & s.t. \\ &\operatorname{Cons} - \operatorname{Flow}: & (1) - (3) & P_{ij} + p_{j}^{\operatorname{g}} = \sum_{k \in \pi(j)} P_{jk} \\ &\operatorname{Cons} - \operatorname{Time}: & (4) & + p_{j}^{\operatorname{d}} + r_{ij} I_{ij}, \forall \, ij \in L \; (\lambda_{j}) \; (11) \\ &\operatorname{Cons} - \operatorname{Emission}: \; (5) & (12) - (16) \\ &\operatorname{Cons} - \operatorname{Cost}: & \lambda_{a}^{\operatorname{M1}} = \lambda_{j} \Omega_{a,j} \\ &+ \sum_{a \in A_{\mathbb{C}}} (\omega t_{a} + \lambda_{a}^{\operatorname{M1}} E_{\operatorname{B}}) \delta_{a,ke}^{r_{S}} \\ &+ V_{ke} \in K_{e}^{r_{S}}, \forall \, r_{S} \in \Gamma \; (6) \\ & (7) \\ &\operatorname{Cons} - \operatorname{UE}: & (8) - (9) \end{split}$$

Model of TNO (Method 2):

$$egin{aligned} \min_{f_{\omega}^{\mathrm{F}},f_{w}^{\mathrm{F}}} C_{\mathrm{users}} &= \sum_{a \in A_{\mathrm{R}}} (\omega t_{a} + \phi arepsilon_{a} l_{a}/10^{6}) x_{a}^{\mathrm{g}} \ &+ \sum_{a \in A_{\mathrm{R}}} \omega t_{a} x_{a}^{\mathrm{e}} + \sum_{a \in A_{\mathrm{C}}} (\omega t_{a} + \lambda_{a}^{\mathrm{M2}} E_{\mathrm{B}}) x_{a}^{\mathrm{e}} \end{aligned}$$

s.t.

Cons – Flow: 
$$(1) - (3)$$

$$Cons - Time:$$
 (4)

$$Cons - Emission:$$
 (5)

Cons - Cost:

(7)

Cons – UE: 
$$(8) - (9)$$

Model of PDNO (Method 2):

$$egin{align} \min C_{ ext{PDNO}} &= \sum_{j \in B} [a_j (p_j^{ ext{g}})^2 + b_j \cdot p_j^{ ext{g}}] \ &+ \kappa \sum_{j \in \pi(0)} P_{0j} \ \end{aligned}$$

s.t.

$$egin{align} P_{ij} + p_j^{\,\mathrm{g}} &= \sum_{k \in \pi(j)} P_{jk} \\ &+ p_j^{\,\mathrm{d}} + r_{ij} I_{ij}, orall \, ij \in L \, \left( \lambda_j 
ight) \, \left( 11 
ight) \, \end{split}$$

$$(12) - (16)$$

$$\lambda_a^{\text{M2,energy}} = \lambda_i \Omega_{a,i}$$

$$ar{
ho} = rac{1}{|B|} \sum_{1}^{|B|} 
ho_j^{
m g}$$

$$\lambda_a^{\,\mathrm{M2}} = \lambda_a^{\,\mathrm{M2,energy}} + \phi ar{
ho}$$

(|B| is the number of buses with generator)