# Activities of Japan Prestressed Concrete Contractors Association

## Les initiatives de l’Association japonaise de la construction en béton précontraint

## Three Basic Policies of Japan Prestressed Concrete Contractors Association

### Carbon-neutral: Environmental conservation measures

Japan has declared that it will become carbon-neutral by 2050.
Japan Prestressed Concrete Contractors Association is actively working to promote the use of precast members, in addition to reducing $CO_2$ emissions with the construction of prestressed concrete structures and developing infrastructure associated with natural and renewable energy.

## Measures associated with the reduction of $CO_2$ emissions

### 1. Reducing $CO_2$ emissions by extending the service life of prestressed concrete bridges

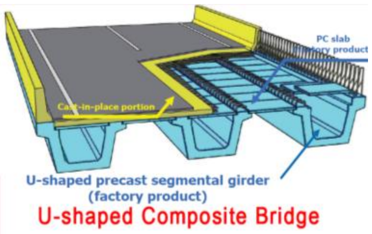
**The longer a PC bridge is in common use, the lower the annual $CO_2$ emissions.**

Construction → Maintenance → Dismantling & recycling

**The amount of carbon dioxide ($CO_2$) emitted throughout the life cycle of a bridge, from construction to maintenance and dismantling, is called $LCCO_2$.**

**•Annual $CO_2$ emissions**
**(Estimated for PC continuous post-tensioned T-girder bridge superstructure & substructure)**

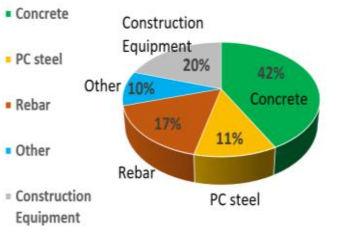

### 2. Promoting the use of precast members, which greatly contributes to the reduction of $CO_2$ emissions




We are promoting the use of precast members (factory products) to replace cast-in-place PC bridges such as hollow slab bridges and box girder bridges.

### 3. Further reduction of $CO_2$ emissions with the construction of the superstructures of prestressed concrete bridges

We will be working to further reduce $CO_2$ emissions from materials with high $CO_2$ emission rates.




CO₂ emission in construction of superstructure
(PC continuous box girder bridge with a span of 50 m)

## Main types of prestressed concrete road bridges and the amount of $CO_2$ emissions

| Type | PC simple pretension T-girder bridge | PC simple post-tensioned T-girder bridge | PC continuous post-tensioned T-girder bridge | PC continuous hollow slab bridge | PC continuous box girder bridge | PC rigid-frame box girder bridge |
|---|---|---|---|---|---|---|
| Type of structure | | | | | | |
| Cross-sectional shape | | | | | | |
| Characteristics | The cross section fabricated (prefabricated) by tensioning prestressing tendons before concreting is T-shaped. | The cross section fabricated (site-fabricated) by tensioning prestressing tendons before concreting is T-shaped. | Structure form by interconnecting post-tensioned T-girders using site-cast reinforced concrete on bridge piers | Bridge built with a beamless deck slab. Fabricated by embedding cylindrical hollow forms for the purpose of weight reduction. | A box girder cross section is used for weight reduction. Often adopted for bridges with relatively long spans. | The cross-sectional shape is similar to a continuous box girder bridge, and piers and girders are rigidly connected. Adopted for bridges in cases where tall piers are used. |
| Erection method | Truck crane erection | Launching girder erection | Launching girder erection | Ground-supported falsework erection | Ground-supported falsework erection | Cantilever erection |
| Span length (m) | 20.0 | 25.0～45.0 | 3@25.0～3@45.0 | 4@25.0～4@35.0 | 4@30.0～4@50.0 | 36+60+36～54+90+54 |
| $CO_2$ emissions per unit area of bridge surface ($t\text{-}CO_2/m^2$) | 0.33 | 0.36～0.49 | 0.35～0.47 | 0.41～0.53 | 0.43～0.46 | 0.45～0.50 |
| Effect of blast furnace slag powder 50% replacement | 0.26 | 0.30～0.39 | 0.28～0.36 | 0.33～0.42 | 0.36～0.37 | 0.33～0.37 |
| Effect of fly ash 20% replacement | 0.31 | 0.34～0.44 | 0.32～0.42 | 0.38～0.48 | 0.40～0.42 | 0.39～0.43 |
| Combined effect of both replacements | 0.23 | 0.27～0.34 | 0.24～0.37 | 0.30～0.38 | 0.33～0.34 | 0.28～0.32 |

➢ The green numbers in the bottom 4 rows of the table represent the values for the superstructure only.

● $CO_2$ emission calculation method

**Materials**
■ Emissions due to manufacture of materials
$CO_2$ emissions ($t\text{-}CO_2$) (e.g., t, $m^3$) = Amount used × Quantity ($t\text{-}CO_2/t$, $CO_2/m^3$)

**Construction equipment**
■ Emissions due to fuel and electric power consumption for construction equipment operation (construction, direct)
$CO_2$ emissions ($t\text{-}CO_2$) = Total number of units used (e.g., units, days) × Emission per unit of fuel consumption ($t\text{-}CO_2$/unit-day)

■ Operation-time depreciation for emissions due to construction equipment production (construction, indirect)
$CO_2$ emissions ($t\text{-}CO_2$) = Total number of units (e.g., units, days) × Operation-time depreciation per unit ($t\text{-}CO_2$/unit-day)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