Appendix 1

Additional information to the proposed JCM methodology
"Introduction of energy efficient wire stranding machines to automotive wire production factory" on setting default value for ECR

1. Market of wire stranding machines in Vietnam

Hearing survey with the local user, it is found that Company A and Company B have high market share of wire stranding machines with the flange diameter of bobbin 560 mm in Vietnam. Company B produces an energy efficient type wire stranding machine which meets the eligibility criteria in this proposed methodology.
Two types of wire stranding machines from Company A are identified, one with normal type bows[1] and another one with energy efficient type bows. Since initial cost (purchase cost) of wire stranding machine with normal type bows is lower than that of energy efficient type bows, the normal type has higher market share in Vietnam. Therefore, wire stranding machine with energy efficient type bows is determined as reference machine in this methodology in a conservative manner.

Table1: Different types of wire stranding machines available in Vietnamese market

	Company A	Company A	Company B
Category	BaU	Reference	Project
Type of bow	Normal	Energy efficient	Energy efficient
Motor capacity[kW]	22	22	11
Maximum twisting speed[rpm]	3,200	3,200	3,500

2. Determination of the default value for electricity consumption ratio per production unit (ECR)

Electricity consumption ratio per production unit (hereinafter referred to as "ECR") is a parameter to be used in an equation to calculate reference emissions. By fixing a default value for ECR in a conservative manner ensures net emission reductions in the proposed methodology.
ECR is a ratio of electricity consumption per production unit of reference wire stranding machine (EPU_{RE}) to that of project machine (EPU_{PJ}).

$$ECR = EPU_{RE}/EPU_{PJ}$$

EPUs for three different types of wire stranding machines in Table 1 have been measured multiple times and collected. Since twisting speed of wire stranding machine has an effect on EPU, EPUs have been measured in different twisting speed for the same wire stranding machine type. Data measured multiple times are averaged for each wire stranding machine type and plotted as shown in Figure 1.

[1] Parts of wire stranding machine which twists multiple metal wires together into a stranded wire.

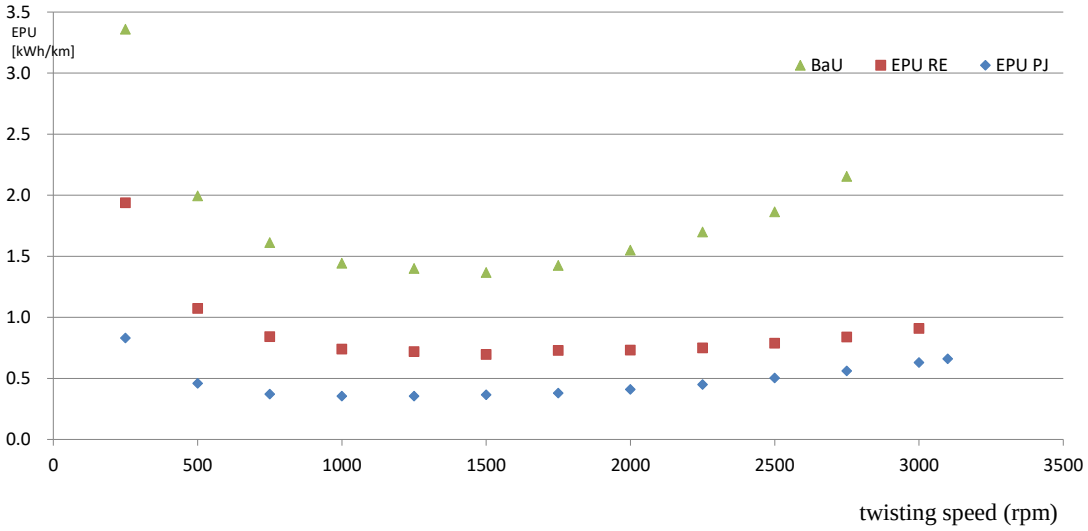

Figure1: Relation between twisting speed (rpm) and EPU

Fourth-order curves have been obtained to approximate the plotted data of EPU_{RE} and EPU_{PJ} (see Figure2), respectively. Both curves show very high coefficient of determination (R^2=0.9793 for EPU_{RE} and R^2=0.9684 for EPU_{PJ}), which also shows clear correlation between EPU and twisting speed.

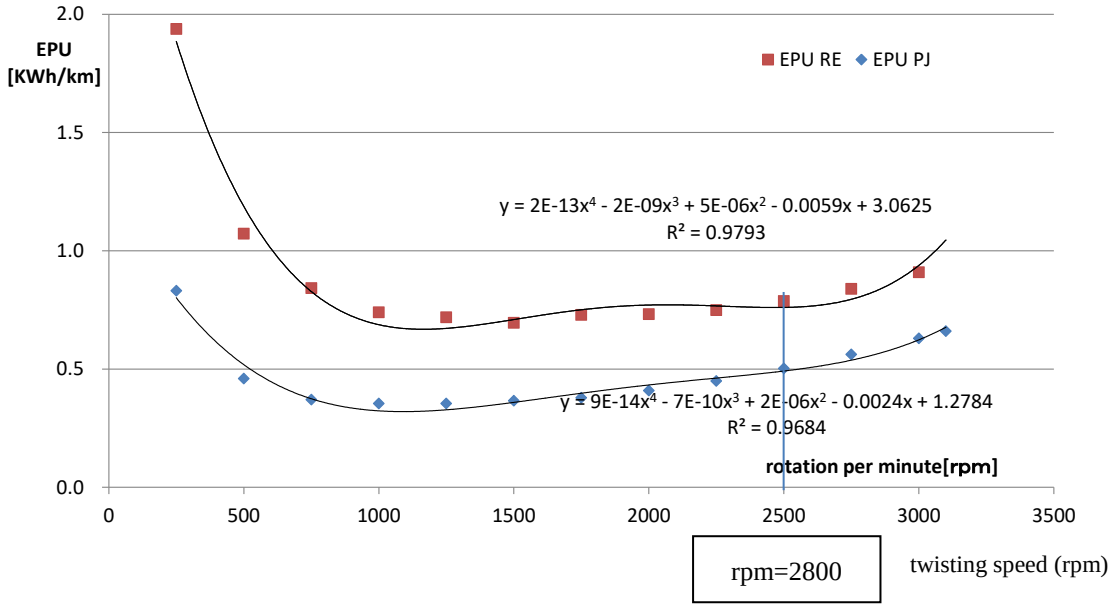

Figure2: Approximation of measured data

Table 2 shows ECR values calculated from measured data of EPU_{RE} and EPU_{PJ}. The value varies depending on the twisting speed, and twisting speed may also vary depending on operational conditions.

Therefore, setting the default value of ECR at the minimum value ensures conservativeness and net emission reductions, which is determined as "**1.51"** as shown in Table 2.

Table2: ECR values

Twisting speed[rpm]	500	1000	1500	2000	2500	2700	2750	**2800**	2850	2900	3000	3200
EPU_{RE} [kW/km]	1.1873	0.6883	0.7120	0.7768	0.7715	0.7956	0.8094	**0.8275**	0.8505	0.8791	0.9563	1.2122
EPU_{PJ} [kWk/m]	0.5177	0.3222	0.3573	0.4299	0.4873	0.5211	0.5324	**0.5453**	0.5601	0.5769	0.6177	0.7369
ECR	2.293	2.136	1.992	1.806	1.583	1.526	1.520	**1.517**	1.518	1.523	1.547	1.645

Minimum value for ECR