Gabriyelyan, Saak S.; Morris, Sidney A.

The authors show that every infinite-dimensional Banach space has $\mathbb{T}^\omega$ as a quotient group, where $\mathbb{T}$ denotes the compact unit circle group. Indeed, they prove, in Theorem 2.1, the same result in a more general setting. In detail, if $E$ is a locally convex space (over either the real or the complex field) which contains as a subspace an infinite-dimensional Fréchet space, then $E$ has $\mathbb{T}^\omega$ as a quotient group.

In addition, the authors provide two examples:

- Example 2.4 shows that the condition in Theorem 2.1 is not necessary.
- Example 2.5 shows that not every complete locally convex space has $\mathbb{T}^\omega$ as a quotient group.

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54H11 Topological groups (topological aspects)
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